

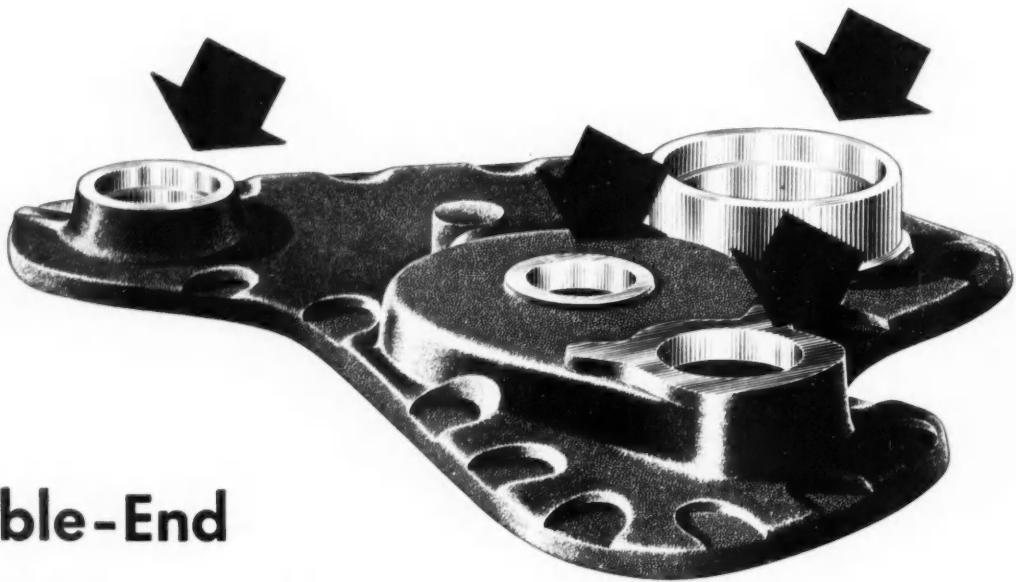
# AUTOMOTIVE INDUSTRIES

DECEMBER 15, 1953

AUTOMOTIVE and AVIATION MANUFACTURING  
CIVILIAN AND DEFENSE  
ENGINEERING • PRODUCTION • MANAGEMENT

**In This Issue ...** Pan-American Race Highlights . . . DC-7 Airliner  
· · · Overhead Valve 161 Hp Mercury Engine . . .  
COMPLETE TABLE OF Higher Powered Chevrolet . . . Pontiac Star Chief  
CONTENTS, PAGE 3 · · · Powerflite Production . . . Colorful Cars

A CHILTON PUBLICATION



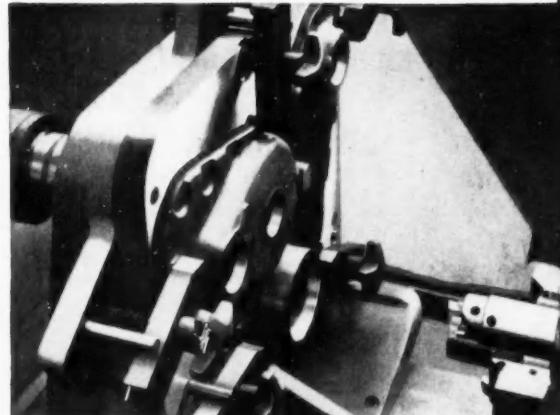
## Double-End Heald Bore-Matic does a 5-HOUR JOB

### in 12 MINUTES

- Precision finishing the four bearing holes in this gear case cover used to be a 5-hour job — requiring separate operations on different machines. But now it's done in *12 minutes flat* — on a single Heald Model 322 Bore-Matic. That's a saving of 4 hours and 48 minutes per part!

All operations, including boring, facing, chamfering and turning, are performed at a single loading, in one high-speed automatic cycle. Four boringheads are used — one on the left-hand bridge and three on the right. The work is automatically presented to the two sets of heads in sequence, after which it returns to center for reloading.

*Remember* — when it comes to precision finishing, it pays to come to Heald.



Internal and Rotary  
Surface Grinding Machines  
and Bore-Matics



**THE HEALD MACHINE COMPANY**

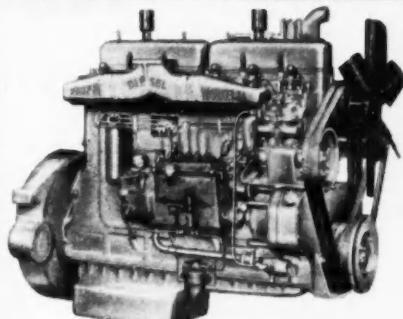
WORCESTER 6, MASSACHUSETTS

Offices in Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

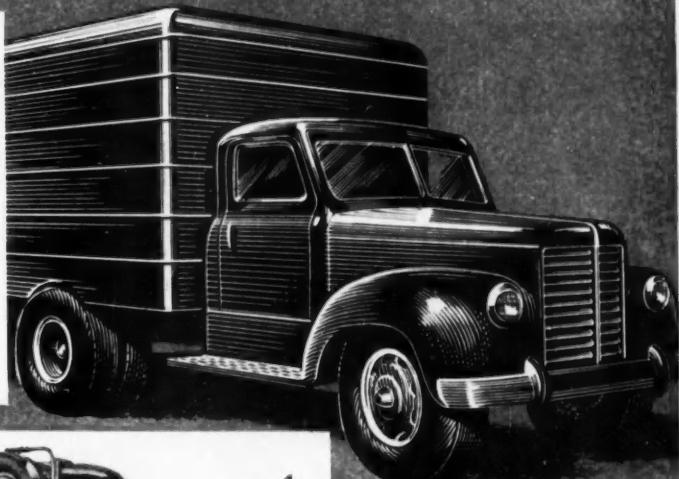
# WAUKESHA

PAYLOAD POWER PLANT

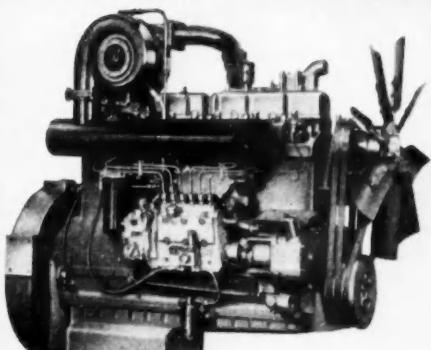
148 Diesel -SERIES-145 Gasoline



148-DKB—NORMAL DIESEL  
779 cu. in. Max. hp 200 @ 2100 rpm.

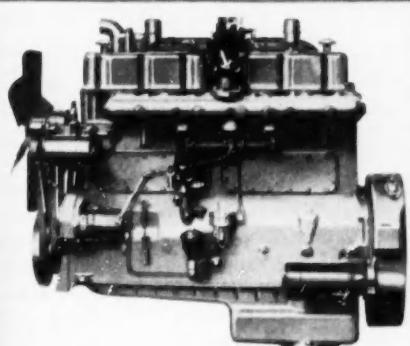


FAST  
SMOOTH  
POWERFUL



SEND FOR BULLETINS

148-DKBS—TURBOCHARGED DIESEL  
779 cu. in. Max. hp 280 @ 2100 rpm.



145-GKB and 145-GZB—GASOLINE  
779 and 817 cu. in. Max. hp 240 and 250 @ 2400 rpm.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS. • NEW YORK • TULSA • LOS ANGELES

AUTOMOTIVE INDUSTRIES, December 15, 1953

# Now it's 900,000 miles and still in excellent condition

It was back in 1949 that this advertisement was first published.

Even then, Mr. Tom Harmon, Superintendent of Maintenance for the Carolina Freight Carriers Corp. of Cherryville, N. C., was excited about the exhaust pipe life he was getting from Inconel®. It had already given at least four and a half times the life of carbon steel pipe and helped him make big savings in replacement and repair costs.

Now read what Mr. Harmon writes after his first Inconel exhaust pipe reached 900,000 miles of trouble-free service—*more than twenty times the life of steel pipe:*

"There are about 56 of these Inconel tubes in our service now. All are giving excellent service and have been given no repair work or service since installation—one exception, the first tube cracked at the weld (flange at tube) after over 300,000 miles. The flange was rewelded to tube and the exhaust pipe was put back on the tractor. The repaired exhaust pipe shows

## INCONEL EXHAUST PIPE GOES 260,677 MILES ...and still no sign of wear out!

With Inconel exhaust pipes on 45 trucks  
Carolina Freight Carriers Corp. reports big  
savings in maintenance and replacement costs.

"This Inconel® exhaust pipe has lasted 260,677 miles  
and it looks as good as though it had been installed last  
week. I believe it will last another 200,000 miles ...  
and maybe more."

The enthusiastic words are from Mr. Thomas M.  
Harmon, Superintendent of Maintenance for the Carolina  
Freight Carriers Corp. at Cherryville, N. C. This  
concern operates 99 tractors, 18 pickup trucks and  
143 large trailers.

Forty-five of the fleet's larger trucks are equipped  
with Inconel exhaust pipes. And not a single service  
call today has ever been caused by an Inconel pipe.

Carolina Freight Carriers Corp. is installing Inconel  
exhaust pipes throughout its fleet. Mr. Harmon states  
that Inconel exhaust pipes replace the originally-sup-  
plied steel pipes as the steel pipes burn out—usually  
within 25,000 to 40,000 miles.

The "tight buck" qualities of Inconel, remarkable

for strength, high resistance to corrosion—make it a  
money-saving metal for other automotive trouble spots.  
In severe road tests, Inconel has long been widely used for clutch plates.

In severe road tests, Inconel has long been widely used for clutch plates.

And Inconel's heat combination characteristics give several

times the service life of less durable metals formerly

used.

If you are a fleet operator or automotive manufac-

turer, you will want to know more about the amazing  
money-saving potentialities of Inconel and other Inco  
nickel alloys. Write for full engineering information

and sources of supply today.

Our Technical Service Department always welcomes  
and lubrication problems.

**THE INTERNATIONAL NICKEL COMPANY, INC.**  
67 Wall Street, New York 5, N. Y.

**INCONEL**...for long life at high temperatures



no damage after over 900,000 miles of operations.

"All Inconel exhaust pipes have between 800,000 and 900,000 miles. None show any signs of deterioration. They are in excellent condition and there is no doubt they will last the life of the tractors."

Whether you are a fleet operator or a manufacturer, this Inconel service-life story is important to you. It points out how you can count on Inconel wherever you need an alloy with excellent hot strength and resistance to heat and corrosion. And it shows that parts made of Inconel will pay for themselves many times over in reduced lay-up time and replacement costs.

You will find that other Inco Nickel Alloys can help you with many a problem where special characteristics are desired. Write Inco's Technical Service Section for aid.

**THE INTERNATIONAL NICKEL COMPANY, INC.**  
67 Wall Street

New York 5, N. Y.

**inco**

**INCONEL**...for long life at high temperatures

A CHILTON MAGAZINE



PUBLISHED SEMI-MONTHLY

# AUTOMOTIVE INDUSTRIES

DECEMBER 15, 1953

VOL. 109, NO. 12

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As part of its worldwide automotive and aviation news coverage, AUTOMOTIVE INDUSTRIES is serviced by International News Service and has editorial correspondents in major United States and foreign industrial centers.

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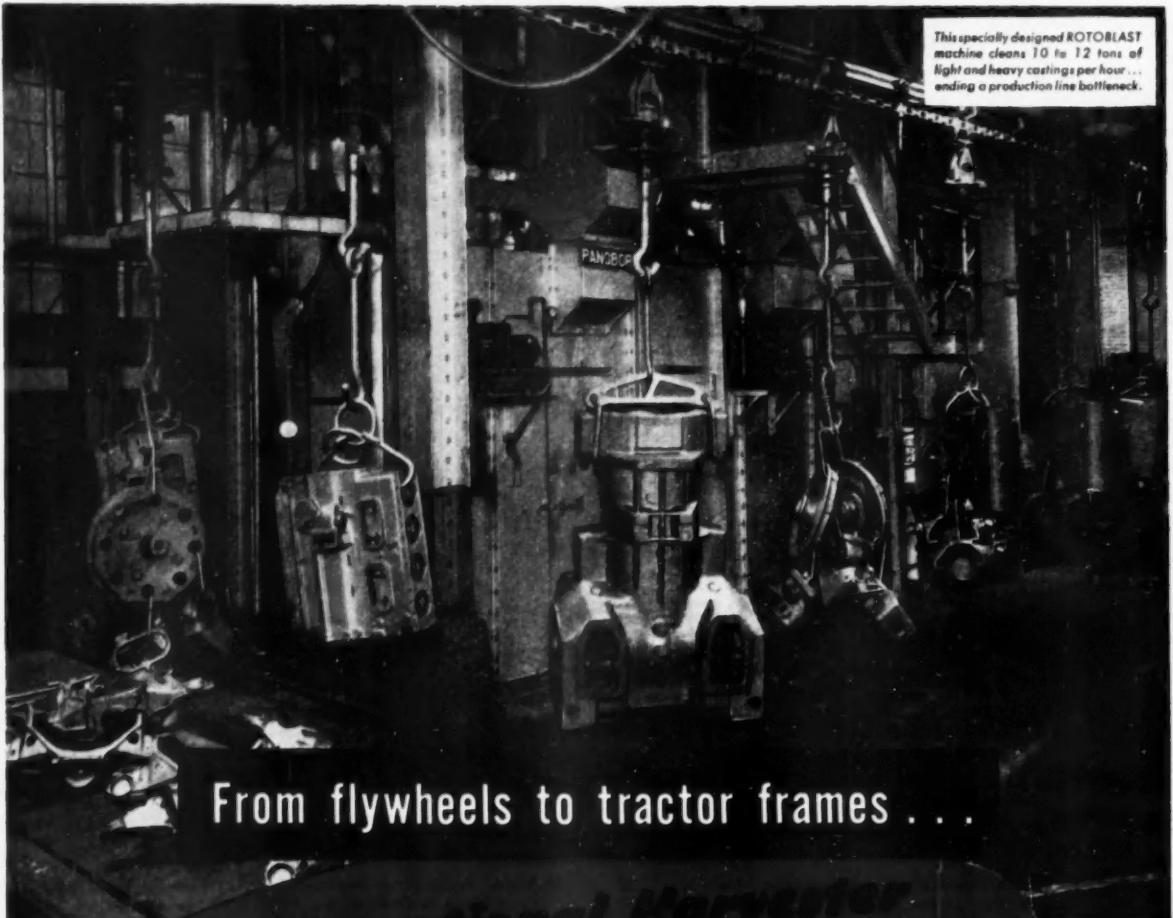


Audit Bureau of Circulations

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This specially designed ROTOBLAST machine cleans 10 to 12 tons of light and heavy castings per hour ... ending a production line bottleneck.

From flywheels to tractor frames . . .

International Harvester  
cleans 10-12 tons per hour  
**PANGBORN ROTOBLAST®**

AT the International Harvester Company's Tractor Works Foundry, the blast rooms and tumbling mills couldn't clean tractor frames, engine blocks, transmissions and bolsters fast enough to keep pace with production. Pangborn engineers were called in . . . they studied the problem . . . and designed the special blast cleaning machine you see here. Automatically handling smaller light work and heavy pieces simultaneously, it ROTOBLASTS 10 to 12 tons per hour. No bottleneck here!

Find out how Pangborn can help you speed production and save money too! No matter how large or small, light or heavy your castings, there's a modern, economical, efficient ROTOBLAST Barrel, Room, Table or Table-Room to solve your blast cleaning problem. For the complete facts, write today for Bulletin 214. Address: PANGBORN CORP., 3900 Pangborn Blvd., Hagerstown, Maryland.

OVER 28,000 PANGBORN MACHINES SERVING INDUSTRY

**Pangborn**

Look to Pangborn for the latest developments in  
Blast Cleaning and Dust Control equipment

**BLAST CLEANS CHEAPER**  
with the right equipment for every job

# POLYKEN TAPE

# cuts water damage claims more than 50%



**Polyken Tape No. 215** seals the doors of this Carolina trailer. Application is fast, inexpensive and sure...tested protection against water damage to cargo in transit.

One of the most effective ways to cut down in-transit water damage and reduce the number of costly claims is to seal trailer doors with tape. And take the word of Carolina Freight Carriers Corporation, Cherryville, North Carolina, for this—there isn't a tape in the field that can do the job as well as Polyken Tape No. 215.

After a lot of experimenting, this company tells you Polyken No. 215 has "all the necessary qualities incorporated into one tape." It is a strong, inexpensive, weatherproof cloth tape which, because of its excellent tack, can be quickly applied. Superior adhesion makes it hold in spite of vibration, wind, rain and snow. The proof: after using Polyken Tape No. 215 on trailer doors for six months, claims resulting from water damage have been cut more than 50%.

This is just one of the many ways Polyken Tapes can cut costs for you. Other Polyken Tapes can make similar savings in tying, holding, bundling and sealing. What's your problem? There's a Polyken Tape tailored to your job. Use the coupon for samples and complete information.

TAILORED TO YOUR JOB

# Polyken<sup>®</sup>

INDUSTRIAL TAPES



Department of Bauer & Black  
Division of The Kendall Company

**Polyken, Dept. AIL  
222 West Adams St., Chicago 6, Illinois**

For physical properties, samples and further information on No. 215 and other Polyken Tapes, please send me your FREE BOOKLET, *Tape is a Tool*.

Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

Street Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

# Users report excellent results with New Sunicut S Oils

In just six months, these unique new straight cutting oils have "Job Proved" themselves as top performers in many metalworking shops all through the industry.

Reports like these keep coming in:

#### **AN AUTO PARTS MANUFACTURER**

**INFORMS US,** "Threaded parts are as much as 50° cooler when they come off the machines. And our operators like the clear, clean, odorless qualities of Sunicut 102-S."

**SCREW MACHINE SHOPS REPORT,** "The versatility of Sunicut 209-S permits us to reduce the number of oils we must stock."

**BROWN & SHARPE SCREW MACHINE OPERATORS SAY,** "Sunicut 11-S increases tool life, gives finer finishes, eliminates staining problem."

#### **LARGE IMPLEMENT MANUFACTURER**

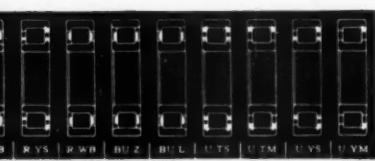
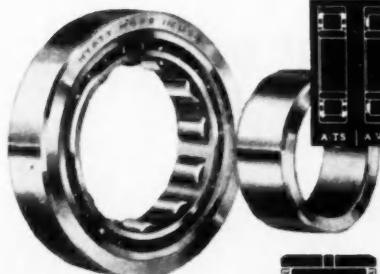
**TELLS US,** "We get better finishes in our broaching operations with Sunicut 110-S, and our operators favor its light color."

Let us show you how these new Sunicut S Oils can help you. For technical bulletins or the services of a Sun representative, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Department AA-12.

**INDUSTRIAL PRODUCTS DEPARTMENT  
SUN OIL COMPANY**

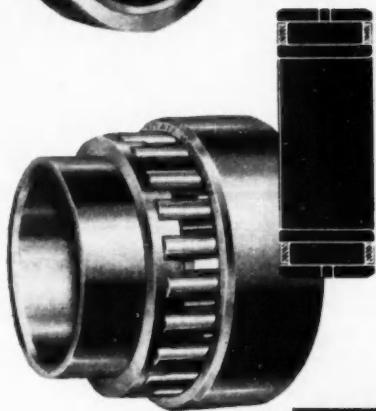
PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL





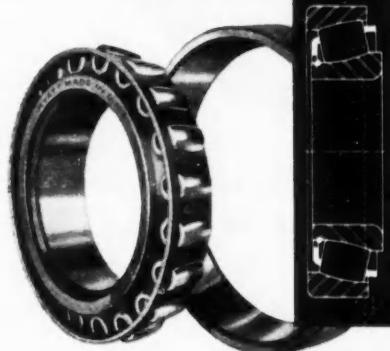
### HY-LOAD

High-capacity, cylindrical roller bearings for heaviest radial loads and light or intermittent thrust loads. Produced in 3 diameter series, 2 widths and more than 800 sizes.

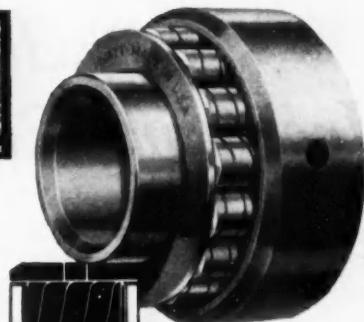


### INDUSTRIAL INCH

Designed for slow-moving, heavily loaded machinery where large-diameter shafts are the rule. Accordingly, it is available in fractional-size bores for shafts from 4" in diameter upwards.

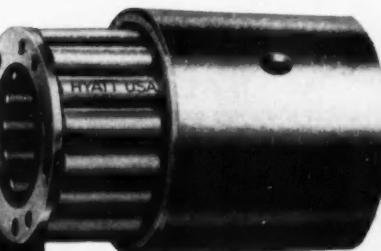


### DESIGNED FOR HEAVY DUTY...



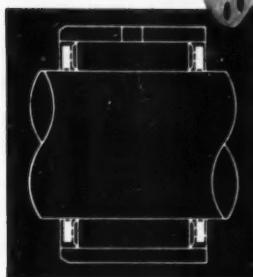
### WOUND ROLLER

This is a three-part separable bearing available in various width classifications. The roller construction provides maximum resistance to shock, abrasion and fatigue.



### TRUNNIONED ROLLER

Ideal for industrial trucks, textile machinery, gear pumps, conveyors, hoists and agricultural equipment. Rollers have trunnioned ends which fit into holes in the end rings. End rings are located and held parallel by spacing bars which also guide and retain rollers.



## HYATT ROLLER BEARINGS

**...and there's a type and size for every need**

Hyatt's complete line of radial and angular contact bearings—*more than 800 sizes in the Hy-Load series alone*—makes the engineers' job easier, because it makes possible greater design flexibility. For the equipment buyer, this means longer bearing life and lower maintenance costs—with just the right bearings designed into every vital load-carrying position.

The next time you buy new equipment, or make a changeover, specify lower maintenance costs by specifying Hyatt Bearings! And if you need technical help in your selection of bearings, or desire information about particular bearings or their applications, ask for the services of a Hyatt sales-engineer. Call or write Hyatt Bearings Division, General Motors Corp., Harrison, N. J.

**HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION**

# **UNITED SPECIALTIES** Expands Production Facilities to meet Increasing Customers' Needs...

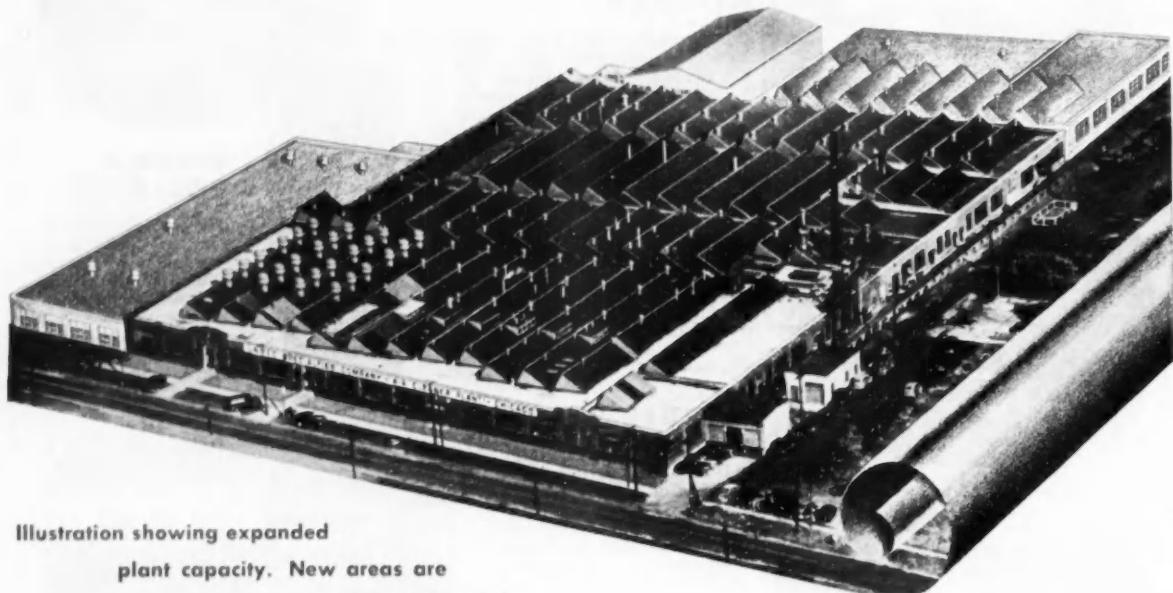


Illustration showing expanded  
plant capacity. New areas are  
indicated in red.

With plant facilities taxed to the utmost to supply an ever increasing air cleaner demand, United Specialties Company blueprints a much needed expansion program. Today, at a cost of over \$900,000, improvements including 54,000 square feet of new floor space, 30 new presses and a modern, streamlined welding department are helping turn out oil bath air cleaners at a record rate.

**Half a Million Dollars for Agricultural Units**  
Of the total appropriation, \$500,000 has gone into expansion of facilities for production of agricul-

tural air cleaners and pre-cleaners. This development has made possible entirely separate assembly lines for agricultural and automotive type air cleaners, with increased facilities for both. Today daily air cleaner production is above the 10,000 mark — an increase of approximately 20 percent.

Whatever your air cleaner requirements, United Specialties Company has the engineering experience — and the production facilities — to handle them. We invite your inquiry.

## **UNITED SPECIALTIES COMPANY**

United Air Cleaner Division — Chicago 28

Birmingham 11, Alabama

Mitchell Division — Philadelphia 36

AIR CLEANERS • METAL STAMPINGS • ROLLED SHAPES  
IGNITION AND TURN SIGNAL SWITCHES • DOVETAILS

United Specialties combination oil bath air cleaner and pre-cleaner.



Hat-type cleaner used on passenger cars and trucks.





# Merry Christmas

May you steer  
a straight course  
to happiness in 1954

# ROSS

ROSS GEAR & TOOL CO.  
LAFAYETTE, INDIANA

Our 48th Yuletide Greeting

# LABORATORY TESTED

for meeting thousands of rigid demands...



The remarkably wide range of uses to which components made and processed by Western Felt is astonishing. It is serving in scores of industries—from women's hats to 50 ton forge hammers. In the automobile field alone, as an example, this felt has been chosen to best serve in more than thirty purposes per car.

Western Felt engineers and chemists for decades have worked in close cooperation with users of felt to give them the very highest quality of material, exactness and uniformity. There are still a world of potential uses for Western Felt products, made to almost any shape, size or consistency. They range from wool-softness to rock-hardness.

When cut, it does not fray or lose shape. It can be cut to close tolerances for such products as gaskets, washers, channels, grommets, filters, seals, etc. It can be made waterproof and fungus-proof and flame resistant. Ask Western Felt engineering cooperation—they have specialized knowledge to aid you.

*Sheet and roll felt manufactured for special purposes and to meet all S.A.E. and military specifications.*

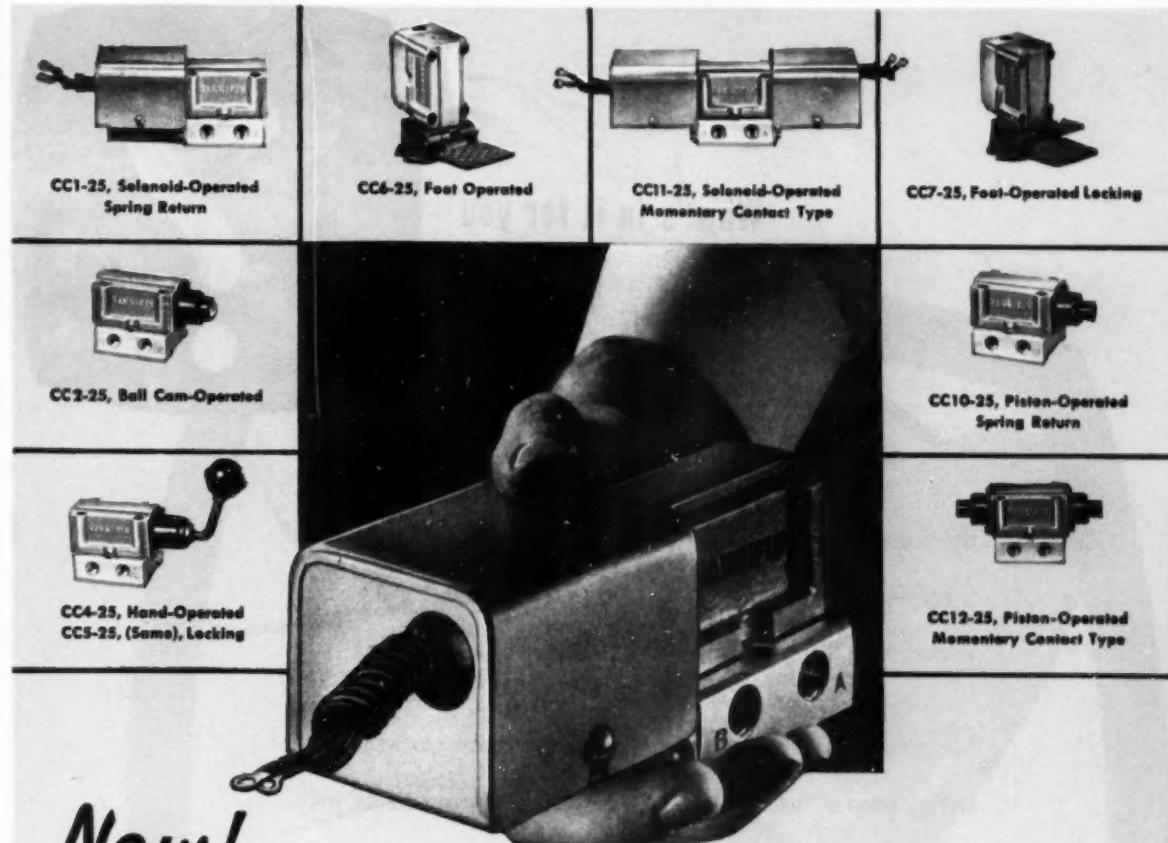
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4035-4117 Ogden Ave.  
Chicago 23, Illinois

Branches in all Principal Cities

**Felt WORKS**

MANUFACTURERS AND CUTTERS OF WOOL FELTS



*Now!*

## **1/4" P-M 4-Way Valves!**

**more compact, less expensive than any similar valves**

Here's a new series of direct-operated 4-Way Valves for the control of small, double-acting air cylinders. It's the latest addition to Hannifin's revolutionary "P-M" line.

**Designed for easier maintenance.** The only moving part is the valve stem with its two poppets. The valve body, which contains this stem, is quickly removed from the separate "manifold" to which all pipe connections are made. Thus, the entire valve can be serviced without breaking line connections.

**The CC Series.** These new "P-M" 4-Way Valves, nominally of 1/4" pipe size, flow so much air that they can be used competitively with other 3/8" valves when ordered with 3/8" ports. They are corrosion resistant throughout and meet J.I.C. recommendations.

**Compare!** You'll find these new Hannifin 4-Way Valves more compact, simpler and easier to use, and *less expensive* than any comparable valves.

**GET THE COMPLETE  
HANNIFIN "P-M"  
AIR CONTROL VALVE  
CATALOG**

The new Hannifin Controls Catalog contains complete information and specifications on all Hannifin "P-M" Valves, including this new 4-Way direct-operated series. Write for Bulletin 232.



# HANNIFIN

Hannifin Corporation, 1143 S. Kilbourn Ave., Chicago 24, Ill.  
Air and Hydraulic Cylinders • Hydraulic Power Units • Pneumatic and Hydraulic Presses • Air Control Valves

## What's in it for you



Before you buy your next multiple spindle automatic bar machine it will pay to ask your Cone Representative about the Conomatic Carbide Development program. He will be glad to tell you what's in it for you.

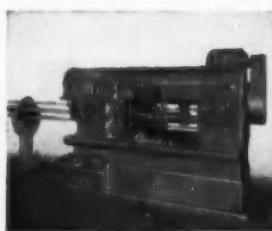
Among the things that your Representative can tell you is how you can be sure that any brand of "automatic", that you may have under consideration, will be equipped to get the most from any modern tool material, including 100% carbide tipped tool applications.

The part illustrated is from regular production runs with HSS and 100% carbide tipped tools. Full particulars are available.



MATERIAL—COPPER: Hole drilled with  $\frac{1}{2}$ " dia. drill to 3" depth; taper formed on OD.

	HSS	CARBIDE
Cycle Time	45 secs.	16 secs.
Work Spindle Speed	670 R.P.M. at 110 S.F.	2026 R.P.M. at 398 S.F.
Tool Wear	150 pcs. per grind	2500 pcs. per grind



# Conomatic

CONE AUTOMATIC  
MACHINE COMPANY, INC.  
WINDSOR, VT., U.S.A.



*Start with welded tubing...  
fabricate to your design*

● There's practically no limit to the design requirements you can meet with Brainard Welded Steel Tubing. You can upset, swage, spin, flange, flatten, taper, or otherwise cold form it. It's an economical structural material—and pound for pound carries more load than any other shape.

Investigate the advantages of Brainard Welded Steel Tubing for your products. Write Brainard Steel Division, Dept. W-12, Griswold Street, Warren, Ohio. An integrated producer; offices throughout the U. S.



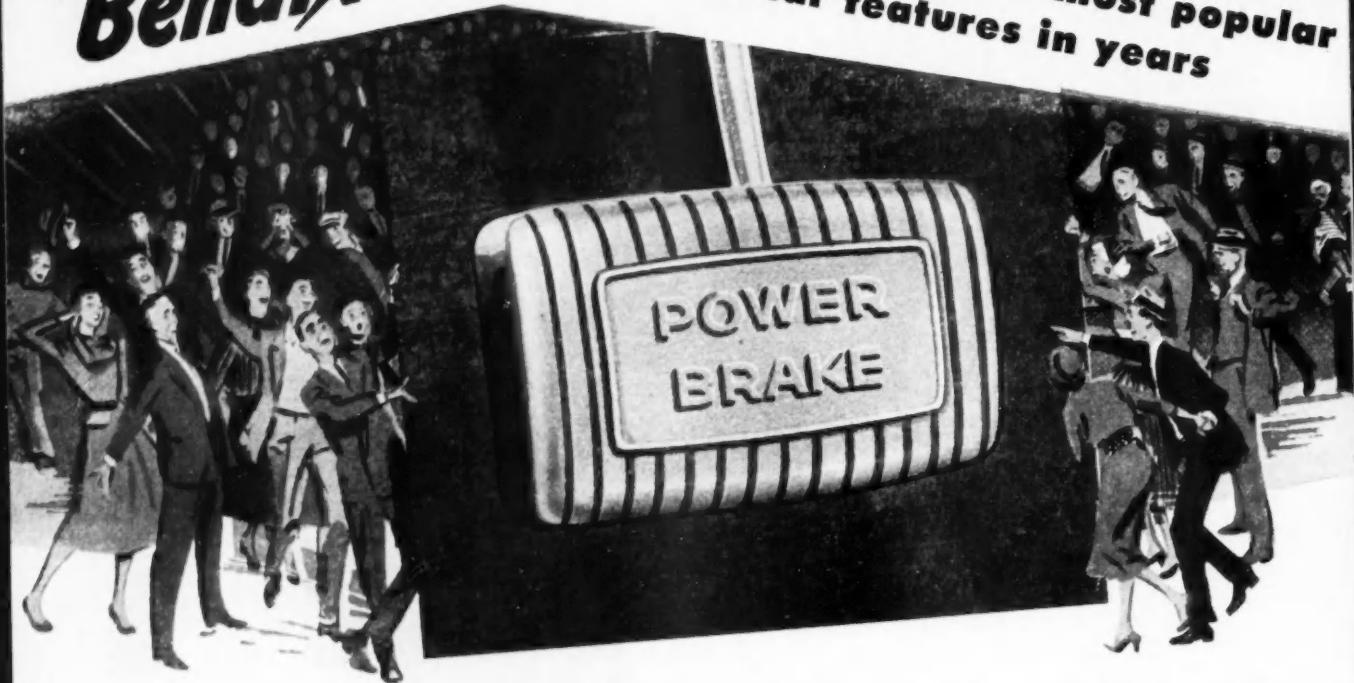
Upsetting is a simple operation. Uniform strength of Brainard Tubing is maintained in severe cold form operations.



**WELDED STEEL TUBING**

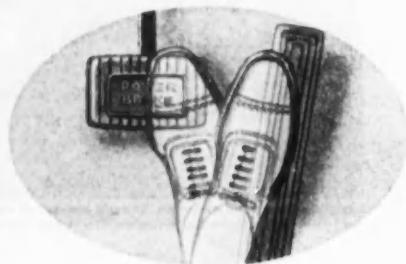
# Bendix Low Pedal Power Brake

one of the most popular  
new car features in years



## Specified by More Car Manufacturers Than Any Other Make

NOW *Stopping*  
IS AS EASY AS *accelerating*



It is no longer necessary to lift the foot and exert leg power pressure to bring your car to a stop. With the Bendix Low Pedal Power Brake on about the same level as the accelerator, an easy ankle movement, much like working the accelerator, is all the physical effort required for braking. And by merely pivoting the foot on the heel, shifts from "go" to "stop" controls are made in far less time.

*Result* MORE DRIVING COMFORT,  
LESS FATIGUE AND GREATER SAFETY

**Bendix**  
**Products**  
**Division**

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MOST TRUSTED NAME IN BRAKING

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## High Spots of This Issue

### ★ Preparedness Pays Off at Pan American Race

Lincoln ran off with most of the honors in the recent Pan-American Road Race by capturing seven of the first ten places. This dramatic account of the 1934-mile contest relates the fates of individual drivers and their cars. Page 32.

### ★ Design Features of the Douglas DC-7 Airliner

Another giant step forward in the phenomenal progress of commercial aviation was taken recently with the entry of the DC-7 into service. Described here are the design features which make the plane "queen" of U. S. airlines. Page 35.

### ★ Mercury Has New Overhead Valve Engine

Observers of the continuing 1954 new car parade will be impressed by the steps which Mercury has taken to produce a new powerplant. Now turning out 161 bhp at 4400 rpm, the engine is used in a trim line of restyled cars. Page 40.

### ★ New British Vehicles at Glasgow Show

Although both cars and trucks were exhibited, the recent Glasgow Show offered novelties mostly in the transport vehicle field. This on-the-spot report details new developments shown and other points of interest. See Page 42.

### ★ Materials Handling in PowerFlite Transmission Production

In this initial section of a two-part article the author covers the operations and equipment in Chrysler's new automatic transmission plant in Indianapolis. Stress is laid on materials handling techniques and their value. Page 46.

### ★ 52 New Product Items

#### ★ And Other High Spots, Such As:

Chevrolet passenger car engines; automatic furnace line; Pontiac brings out Star Chief series; GM Diesel output increased; colorful cars; sports cars at West Coast Motorama; cascade system for Argon; new White engine.

**Automotive and Aviation News, Page 17**

**Complete Table of Contents, Page 3**

AUTOMOTIVE INDUSTRIES COVERS  
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES  
BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY  
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT  
SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT  
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- ALLOYS**—Hot rolled, cold finished, heat treated
- STAINLESS**—Allegheny bars, plates, sheets, tubes, etc.
- REINFORCING**—Bars & Accessories, spirals, wire mesh
- BABBITT**—Five types, also Ryertex plastic bearings
- MACHINERY & TOOLS**—For metal fabrication

# RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND • DETROIT  
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# News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 109, No. 12

December 15, 1953

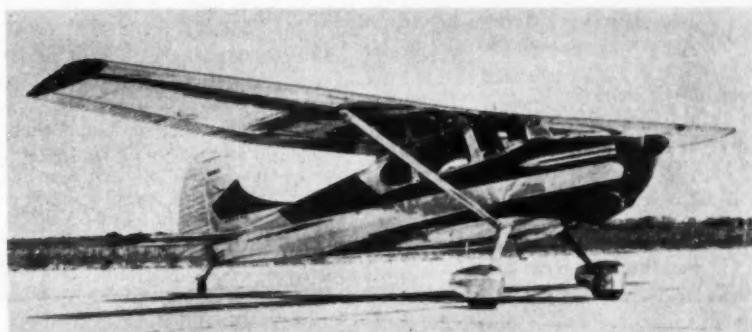
## Low-Price Cars Out to Get Sixty Per Cent of Market

For the first time since before World War II, manufacturers of low-priced passenger cars expect to return to their pre-war percentage of industry sales. W. E. Fish, general sales manager of Chevrolet, made the prediction in Detroit recently that the low-priced field next year will account for 60 per cent or more of sales, the percentage it held prior to World War II. At present, the low-priced group is accounting for about 54 per cent of the market.

The prediction raises some interesting speculation as to how the 60 per cent will be divided, since there are now three additional makes competing in that field. Before the war, Chevrolet, Ford, Plymouth, Willys, and Studebaker Champion were in the field. Since that time, however, the Henry J, Nash Rambler, and Hudson Jet have come into the picture.

The principal question, of course, revolves around the relative percentages to be achieved by Ford and Chevrolet. Mr. Fish cast some light on this subject when he pointed out that Chevrolet's percentage of price class had varied less than one per cent since 1940, whereas Ford has increased about six per cent, obviously at the expense of other companies than Chevrolet.

Even if the low-priced cars do climb to 60 per cent of industry sales, the prewar ratio, the greater number of cars in the field would indicate that the Big Three, plus Studebaker, would as a group still have something below their prewar percentage. There is, of course, the possibility that this price class may exceed 60 per cent by a wide enough margin to permit the five prewar makes to equal their previous percentage, plus whatever can be picked up by the later entries.



**STREAMLINED FLYER**

Appearing on the horizon for 1954 is the Cessna Model 170 business-pleasure plane. Powered by the Continental C-145 2 six-cyl. 145-hp engine, the all-metal craft has a top speed of over 140 mph and a service ceiling of 15,500 ft. It has a wing span of 36 ft, length of 25 ft, and a height of six ft, seven in.

## Willys to Offer Hydra-Matic Soon

Willys will offer Hydra-Matic transmission as optional equipment on its 1954 models. There is a possibility that it may be made standard equipment on the Eagle, highest-priced car in the line. Willys actually was very close to announcement of Hydra-Matic as an option just prior to the General Motors fire and, in fact, had already installed the units on a small number of cars.

## New Ford Unit Car May Be Year Away

The recent announcement by Ford that it has created a Special Product Div. indicates that a new luxury car is not too far away. More definite reports continue to grow that it will be a revived "Continental." (See AUTOMOTIVE INDUSTRIES, Dec. 1, p. 98.) According to the best information available, it might be ready in about a year.

The Continental, if such it is to be, will not be produced by Lincoln-Mercury, but by the new division and reportedly will be the most expensive

production model put out by any major manufacturer. The other new car in the Ford line to fall between Mercury and Lincoln is expected to be produced by Lincoln-Mercury Div. (See AUTOMOTIVE INDUSTRIES, Nov. 15, p. 17.)

## Allison J-35-A-35 Turbojet to Power Northrop Plane

Northrop Aircraft has announced that the J-35-A-35 turbojet engine produced by Allison Div. of General Motors Corp. will be used to power its F-89D long-range interceptor. Ceiling of the plane with the new engine was not announced.

## Maremont Automotive Buys Grizzly Mfg.

Maremont Automotive Products, Inc. has bought Grizzly Manufacturing Co., with plants at Paulding, O., and Bell, Calif. Purchase price was approximately \$2 million. Maremont will operate Grizzly as a division with no changes in organization or personnel according to the announcement at the time of the sale.

# News of the AUTOMOTIVE

## Chevrolet to Increase Luxury Line Output

Chevrolet's experience with the Bel Air line indicates clearly that the public still definitely is interested in deluxe models. When the Bel Air line was introduced, original schedules called for something like 25 per cent of production.

The percentage, however, was increased and will total about 37 per cent for the year. In the first quarter of 1954, Chevrolet is expected to allocate 45 per cent of its total production to the Bel Air.

## Some Car Dealers Seek Factory Control Laws

Despite opposition from both automobile manufacturers and NADA officials, certain dealer groups still are talking of state legislation to control the activities of manufacturers in relation to their dealers.

During the lush years following World War II not much was heard about such legislation. Now that active competition has returned, however, the subject is coming up again

and probably will continue to be in evidence next year when the struggle for sales will become even more bitter.

A few states now have laws governing manufacturer-dealer relationships. However, from all available evidence, it appears that dealers in those states are not notably happier than those in other states having no such regulations.

An interesting point is that in one of the states with a licensing law, not only the automobile manufacturers, but dealers and salesmen also are included in and are subject to revocation of their licenses for specified offenses, some of which have been more or less common practice in the trade. Actually, the dealers in question were active in getting the law passed and now find themselves in as precarious a position as the manufacturers whom they were trying to have brought under control.

Both industry leaders and NADA officials are firmly convinced legislation is not the answer to dealer-factory problems, but rather conferences between the two parties. Considerable progress has been made in the field of dealer relations through councils.

## Most Car Makers Hold Price Line on 1954's

Despite a contrary trend by Studebaker, which increased prices an average of nearly \$83 on its 1954 models, the industry trend still is to hold the line or cut prices.

Nash made price cuts on ten models ranging up to \$160, although it also raised prices on two models by about \$30. Hudson cut prices on its new line, while Chrysler reduced prices on 12 models; Plymouth, Dodge, and De Soto remain pretty much unchanged for 1954.

General Motors and Ford are expected to hold the price line on their new models. In the case of the latter, Lincoln-Mercury Div. has already suggested a reduction of \$51 in the price of the Capri four-door sedan and a cut of \$20 in the price of the power steering unit. Other Lincoln prices remain the same as last year.

At a recent press conference before a dealer showing of its new line, James J. Nance, Packard president, said that prices will remain basically unchanged on its 1954 cars. In predicting that there will be considerable turnover in automobile dealers next year, Mr. Nance went on to say that Packard will keep on with about 1500. The company has inaugurated intensive sales training programs in Detroit for its field representatives and will sponsor sales clinics for dealers and their salesmen.

## 1953 MOTOR VEHICLE FACTORY SALES\*

	Passenger Cars	Trucks	Buses	1953	1952	Totals
January	453,310	111,590	264	585,172	375,410	
February	486,071	98,740	190	583,001	435,216	
March	586,320	134,129	236	700,685	482,973	
April	596,633	128,754	145	723,532	529,585	
May	549,677	93,443	367	643,487	503,917	
June	587,549	74,063	380	681,992	518,710	
July	599,134	105,622	376	705,132	211,782	
August	513,457	101,478	447	615,382	270,982	
September	475,289	98,051	348	573,666	551,159	
October	528,088	91,981	519	620,588	604,291	
Total—Ten Months	5,355,537	1,033,860	3,262	6,392,659	4,483,985	

## 1953 MOTOR TRUCK FACTORY SALES BY G.V.W.\*

	5,000 lb. and less	5,001- 10,000	10,001- 14,000	14,001- 18,000	18,001- 19,500	19,501- 26,000	Over 26,000	Total
January	53,077	21,481	4,087	18,333	3,950	8,786	3,905	111,909
February	48,121	18,279	3,413	13,305	4,287	8,258	4,080	86,740
March	59,951	25,153	6,159	22,962	5,618	9,503	4,763	134,129
April	55,652	25,680	5,770	21,006	5,187	8,856	4,804	126,754
May	43,812	16,283	3,580	13,379	4,823	7,900	3,656	83,443
June	33,297	11,620	2,169	10,102	4,546	8,217	4,101	74,063
July	61,318	18,697	4,220	15,768	4,231	7,635	3,753	105,622
August	47,884	16,611	4,241	15,899	3,850	6,930	4,363	101,478
September	49,159	18,000	3,610	14,380	3,508	5,163	4,221	98,051
October	44,951	17,658	3,355	13,513	3,683	4,462	4,346	91,981
10 Mos., 1953	484,222	191,486	40,804	156,386	43,086	75,887	41,815	1,033,860
10 Mos., 1952	391,860	190,972	47,866	184,913	40,088	67,946	38,003	982,470

\* Automobile Manufacturers Association.

## Ford Div. Opens Up Service Laboratory

Ford Div. of Ford Motor Co. recently opened its new Technical Service Laboratory at Livonia, Mich. The facility is designed to develop procedures and materials for servicing and maintenance of Ford vehicles.

More than 200 persons, including engineers, technicians, and mechanics, are employed in the laboratory, developing dealer services, product information and technical standards. The laboratory has a completely equipped model garage with its own engine and chassis dynamometers for testing performance under various stresses and load conditions from the service viewpoint.

# AND AVIATION INDUSTRIES

## Hudson Talks Merger "With More than One"

Hudson has revealed that it has held discussions with more than one other company to explore the possibility of consolidation or cooperation. This revelation by A. E. Barit, Hudson president, comes as something of a surprise.

Nash had been considered the only company interested in exploring merger possibilities with Hudson at the moment. Mr. Barit said that none of the talks have proceeded far enough to indicate their eventual outcome and that his company is weighing all factors deliberately.

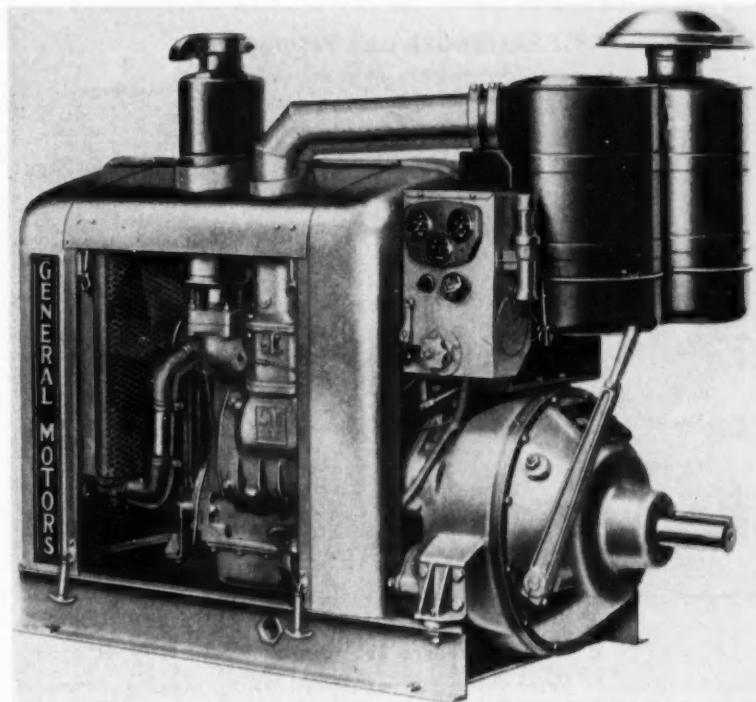
Mr. Barit added that nothing in Hudson's economic picture calls for hasty decisions. He pointed out that the company's assets total \$125 million and that the book value of its stock has increased by \$14.86 a share to \$37.13 now since World War II.

The Hudson president also challenged any contentions that independent automobile manufacturers cannot compete with the Big Three. He stated that such beliefs are absurd in view of the engineering and design advances pioneered by the independent companies.

## Car Credit Total Is Leveling Off

Automobile installment credit outstanding is leveling off and may decline somewhat, according to Robert L. Oare, chairman of Associates Investment Co. He recently said that the last of the installment contracts limited to 18 months under Regulation "W" were paid out in November and that the rate of repayment on car loans again will be approximately the same as the new business rate.

Mr. Oare added that the current picture of outstanding automobile credit has been distorted by the fact that aggregate outstanding balances of installment contracts increased because lengths of contracts were extended to bring about smaller monthly payments. This, he said, resulted in total credit outstanding in any given month being greater than it would have been under the shorter terms dictated by Regulation "W."



## VALVELESS DIESEL

Recently made available for industrial use by Detroit Diesel Engine Div. of General Motors Corp. is the valveless "4-51" unit. This Diesel power package develops 76 bhp at 2500 rpm and weighs only 1450 lb. The engine is of two-cycle design with a Roots-type blower that forces fresh air into and exhaust gases out of the four cylinders. Bore and stroke are both 4.1 in., and compression ratio is 18:1. Dimensions are: length, 54 in.; width, 28 in.; and height, 48 in.

## Kaiser Toledo Transfer Is Expected Very Soon

It appears fairly definite now that Kaiser Motors will move its automobile production to Toledo within the next month or two. Output of Henry J's was ended at Willow Run by Dec. 1, and 1954 model Kaisers are now being built to supply dealers with display cars.

## 1953 Vehicle Output To Pass 7.3 Million

Predictions made at the outset of 1953 on vehicle production were certainly ultra-conservative in view of the production record the industry will achieve this year. It now looks as though total output in 1953 will approximate 7.37 million, the second

highest year on record by a substantial margin. Last January, forecasts indicated that the industry was looking for a total of not more than 6.5 million cars and trucks this year.

Passenger cars account for most of the gain in production over the original forecasts. About a year ago, most forecasts were for somewhere in the neighborhood of 5.5 to 5.6 million cars. At the end of November, however, production stood at more than 5.7 million units. If December schedules hold, the total for the year should tally about 6.16 million.

Truck production, originally estimated at about 1.1 million for the year, hit that point by the first of December. It should be very close to 1.2 million when the year draws to a close the end of this month.

# News of the AUTOMOTIVE

## 1953 PASSENGER CAR PRODUCTION

(As reported by the car factories)

	November 1953	October 1953	November 1952	Eleven Months	
Chrysler	11,420	12,357	10,655	149,233	102,650
De Soto	11,187	7,716	10,308	119,315	84,661
Dodge	20,280	25,918	27,893	280,168	221,784
Plymouth	48,205	67,641	48,457	613,375	409,921
Total—Chrysler Group	91,072	113,632	95,374	1,162,111	819,206
Ford	110,981	132,115	65,234	1,122,456	685,537
Lincoln	2,405	None	2,150	37,600	28,861
Mercury	19,431	36,600	22,381	289,494	172,141
Total—Ford Group	132,797	168,723	89,765	1,449,550	806,530
Buick	17,695	41,792	28,518	471,432	301,268
Cadillac	10,050	7,095	6,024	99,792	90,716
Chevrolet	37,219	132,955	90,505	1,349,248	831,061
Oldsmobile	24,981	14,408	19,425	309,448	213,347
Pontiac	18,460	31,343	14,877	380,743	248,918
Total—G. M. Group	108,301	227,583	159,147	2,610,563	1,685,330
Henry J and Kaiser		None	7,342	19,804	66,770
Willys		None	2,208	4,677	40,186
Total—Kaiser Group			2,288	12,019	59,990
Hudson	5,239	4,150	5,121	71,241	68,802
Nash	8,633	7,699	16,884	127,655	137,607
Packard	852	446	5,129	76,077	53,809
Studebaker	13,812	6,437	20,254	174,127	152,422
Total All Makes	380,746	529,068	403,693	5,731,414	3,917,135

## New Ferro Subsidiary

The formation of Ferro Powdered Metals, Inc., Salem, Ind., a new, wholly owned subsidiary of Ferro Corp., Cleveland, O., has been an-

nounced. Ferro supplies powdered metal machine parts to the aircraft, automotive, agricultural equipment and other industries.

## 1953 NEW PASSENGER CAR REGISTRATIONS\*

Arranged by Makes in Descending Order According to the 1953 Ten Months' Totals

MAKE	October 1953	September 1953	October 1952	TEN MONTHS	
				Units 1953	Per Cent of Total 1953
Chevrolet	125,047	112,356	88,811	1,152,700	694,791
Ford	118,986	106,424	79,037	906,957	578,381
Plymouth	63,430	46,074	31,638	505,955	358,888
Buick	38,370	36,062	30,753	392,440	257,716
Pontiac	28,852	25,626	27,114	332,253	219,796
Oldsmobile	18,030	18,282	21,802	266,041	180,514
Dodge	22,658	19,174	16,860	251,069	203,464
Mercury	33,806	26,617	15,620	230,775	145,063
Studebaker	14,287	13,944	12,045	140,529	129,377
Chrysler	11,318	10,926	5,710	130,749	93,622
Nash	7,282	7,377	12,494	123,476	118,197
De Soto	10,252	9,538	6,767	103,732	74,620
Cadillac	4,570	3,066	9,043	42,396	75,388
Packard	4,170	4,456	4,824	64,747	56,401
Hudson	4,914	3,630	6,255	58,363	67,981
Willys	2,419	2,483	3,648	38,367	33,741
Lincoln	2,380	2,682	3,266	35,206	24,010
Kaiser	1,007	1,181	3,494	21,323	33,862
Henry J	435	520	1,430	16,161	25,635
MG (British)	444	462	687	6,018	6,383
Hillman (British)	389	309	485	3,934	4,034
Jaguar	314	270	357	3,418	2,644
Ford (British)	234	211	426	3,253	3,125
Austin (British)	208	161	322	2,744	4,283
Allstate	27	30	114	680	1,385
Misc. Domestic	38	31	92	1,380	3,522
Misc. Foreign	670	690	500	6,108	4,108
Total—All Makes	504,697	453,806	383,365	4,874,741	3,398,232
				100.00	100.00

\* Based on data from R. L. Polk & Co.

## 1953 New Car Sales May be 5.7 Million

Official registration figures for October again fail to support some general impressions that automobile sales are in the doldrums. R. L. Polk Co. reports that October sales actually showed an uptrend after a steady month-by-month decline that started last June. Registrations for the month totaled 504,697, an increase of 51,291 over September.

Since total new car sales at the end of October stand at 4,874,741, this year definitely will be far and away the second best on record. It will far surpass the 5,060,903 registrations of 1951, the previous second best year.

Although official figures will not be in on November registrations until late December, the 1951 figure probably was passed the middle of November. Even if it is assumed that registrations should drop to as low as 400,000 a month for November and December, a highly unlikely prospect, the industry still would register more than 5.6 million cars this year. A more likely estimate is 5.7 to 5.75.

## Chevrolet, Ford Set for Fight to Finish

The growing hot competitive battle between Ford and Chevrolet for first place in car production was again pointed up recently. In a statement made before the Investment Bankers Association, Ernest R. Breech, executive vice-president of Ford Motor Co., said that Ford plants will continue on overtime schedules for the first quarter of next year and probably for some time thereafter.

On the other hand, W. E. Fish, general manager of Chevrolet, stated recently that production for the first quarter of 1954 would exceed that for the first three months of 1953. He went on to add that Chevrolet does not intend to yield first place.

## New Orders for Bell

Bell Aircraft Corp. has received new orders from the Government totaling more than \$35 million. They are understood to be in the field of guided missiles.

# AND AVIATION INDUSTRIES

## Standard Motor Co. Forms An American Subsidiary

The Standard Motor Co., Ltd. of England has announced the formation of a U. S. subsidiary—Standard-Triumph Motor Co., Inc. Head offices of the firm will be located in New York City with branch offices situated in Los Angeles and other important sections of the country.

Standard-Triumph will import and distribute a line of cars which includes: the Triumph T.R. sports car; the Doretti; the Standard Vanguard; and the Standard Cadet. These cars will be shown for the first time in the U. S. the first week of January on the West Coast in Los Angeles and will be introduced on the East Coast at the Third International Sports Car Show in New York City, Feb. 6 to 14.

The Triumph T.R. 2, the Standard Vanguard, and the Standard Cadet (new trade name for the Standard Eight) were exhibited at the recent French Automobile Salon (see AUTOMOTIVE INDUSTRIES, Nov. 15, p. 42) and the London Motor Show (see AUTOMOTIVE INDUSTRIES, Dec. 1, p. 62). The Doretti is a new offering from the Swallow Coachbuilding Co. (1935), Ltd., former builders of the Jaguar. The car is known to have a tubular chassis, but other details will not be available until later.

## Morris Motors Sets Up Canadian Subsidiary

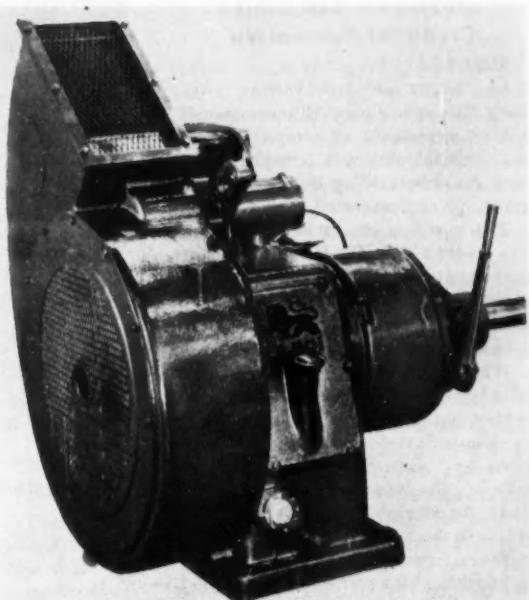
Morris Motors (Canada), Ltd. has been formed by the parent company, Morris Motors of England, with a capital investment of \$1 million. The Canadian company will have its main office at Hamilton, Ont., where a parts depot will be established and service and merchandising headquarters set up. The Canadian unit will handle mainly Morris Minor, Morris Oxford, and the MG sportscar. The British company has in recent years sold some 40,000 automobiles in Canada.

## New ASLE Address

The American Society of Lubrication Engineers has announced a move to The Western Society of Engineers Building. It is located at 84 E. Randolph St., Chicago 1, Ill.

## OIL PUMPER

*The A114 single-cyl. valve-in-head pumping engine has been added to its line of products for the petroleum industry by Le Roi Co. Designed especially for oil field use with an extra-heavy flywheel, it has a 114 cu. in. displacement and will develop 14.8 maximum hp and 9.7 API hp at 1200 rpm.*



## Car Makers Study Exhaust Gas Problems

Automobile manufacturers are carrying on a long range research project on vehicle exhaust gas problems. Charges that exhaust fumes aggravate smog and air pollution problems in congested areas are

totally unsupported by any currently available data. A special committee, however, will study the problem thoroughly to determine whether such gases are harmful and, if so, what counter measures can be developed.

## 1953 NEW TRUCK REGISTRATIONS\*

Arranged by Makes in Descending Order According to the 1953 Ten Months' Totals

MAKE				TEN MONTHS			
	October 1953	September 1953	October 1952	1953	1952	1953	1952
Chevrolet	29,441	27,205	27,813	284,174	220,964	36.02	32.90
Ford	27,816	25,463	15,294	213,281	146,525	27.02	21.81
International	7,407	7,213	8,728	82,661	79,426	10.47	11.82
G. M. C.	6,413	6,427	8,105	71,925	68,289	9.11	9.87
Dodge	5,254	6,181	9,180	70,854	66,473	8.96	12.87
Studebaker	1,585	1,578	2,089	20,296	24,496	2.57	3.85
White	1,087	814	1,058	10,480	9,531	1.33	1.42
Willys Jeep	784	740	777	7,755	6,883	.98	1.02
Willys Truck	638	528	1,244	7,290	9,562	.92	1.42
Mack	661	631	697	5,967	6,174	.76	.92
Reo	284	273	381	3,025	2,810	.38	.42
Ciambell T	309	297	323	2,026	2,937	.37	.44
Dive	323	217	242	2,128	2,416	.27	.36
Brockway	186	155	171	1,738	1,390	.22	.21
Autocar	201	130	156	1,513	1,308	.19	.19
Federal	45	110	74	631	710	.11	.11
Kenworth	57	64	61	680	609	.09	.09
Pontiac	49	32	46	414	425	.05	.06
Peterbilt	23	172	24	316	208	.04	.03
F. W. D.	26	38	73	311	443	.04	.07
Misc. Domestic	27	30	135	425	1,890	.05	.28
Misc. Foreign	35	23	14	241	250	.03	.04
Total All Makes	82,661	78,319	77,486	789,231	671,718	100.00	100.00

\* Based on data from R. L. Polk & Co.

# News of the AUTOMOTIVE

## Studebaker \$25 Million Credit for General Use

Studebaker Corp. recently established a \$25 million revolving credit fund for general use. Simultaneously, a loan agreement of comparable size for defense work was terminated. No immediate borrowing against the new credit is contemplated, however.

The previous credit was started in April, 1952 for the financing of defense contracts. A formula in existence at that time allowed borrowing against the company's investment in such projects.

When the Air Force last spring cancelled orders for \$100 million worth of J-47 jet engines, a cut of one-third in planned production of these engines by Packard and Studebaker resulted. Studebaker expects to complete its work on current J-47 contracts in the next few months. Its last military truck under contracts then in existence was turned out in August.

## Vehicle Labor Rates Up Two Cents an Hour

Labor costs for vehicle manufacturers took another two-cent-an-hour jump Dec. 1. Cost-of-living allowances were increased at that time because of rise in the Government's price index.

All major vehicle manufacturers operate under labor contracts which gear hourly rates to the Consumer's Price Index, and most suppliers also are governed by similar agreements. In general, it is not likely that the wage increases will be reflected in higher prices for cars and trucks.



*Christopher combination ambulance, fire truck, and patrol wagon has detachable panels on both sides which conceal fire-fighting equipment. Suction and discharge are possible from either side to eliminate positioning of vehicle.*

## Automotive Items Attract Interest of New York Export Show

Automotive vehicles and parts were in the forefront of the wide range of products displayed at the first New York Export Show, which was held recently at the Lexington Ave. Armory and attracted buyers from all over the world.

In addition to the interest centered on the new line of trucks shown by Four Wheel Drive Auto Co. (see AUTOMOTIVE INDUSTRIES, Dec. 1, p. 60), considerable attention was aroused by a new vehicle (see cut) displayed by The Christopher Co. Known as the FAPA, it is a combination ambulance, fire engine, and emergency truck. Custom-built on a Chevrolet or GMC truck chassis, it sells in the neighborhood of \$6,000. A unique and space-saving arrangement of tanks, pumps, hose reels, stretchers, and emergency kits gives the vehicle its unusual ver-

satility. Christopher also showed an experimental rear-engine sports car, known as the "Centaur," which is built on a Ford chassis.

Other automotive exhibitors and their products included: American Manufacturing Co. (mobile refrigeration units); Brake Lining Supply Co. (brake linings); City Tank Corp. (various trucks and refrigeration units); Northwestern Auto Parts Co. (power take-off units, automotive, and tank parts); Preferred Electric & Wire Co. (wire and cable); R. A. Rodriguez, Inc. (ball and roller bearings, automotive and marine engine parts); Smith, Kirkpatrick & Co., Inc. (tractor and agricultural implements, de-scalers, and spark plugs); Southern Mills (seat cover fabrics); John T. Stanley Co. (automotive chemicals); and Star Rubber Co. (tires and tubes).

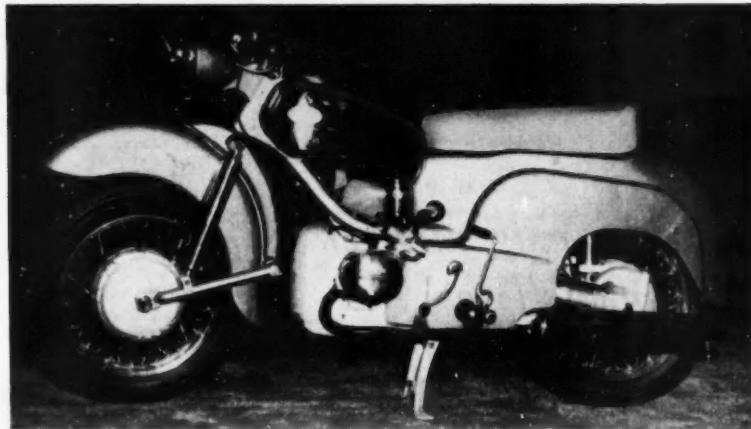
## REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	October 1953	September 1953	October 1952	Ten Months		Per Cent Change		
					1953	1952	Oct. over September	Oct. over Oct. 1952	Ten Months 1953 over 1952
1	New England	31,422	23,540	22,243	282,493	196,401	+29.04	+41.27	+43.83
2	Middle Atlantic	103,948	89,294	69,748	946,022	641,022	+11.64	+49.04	+47.73
3	South Atlantic	50,397	53,375	45,247	554,290	401,693	+11.28	+31.27	+37.90
4	East North Central	137,689	117,820	94,256	1,281,596	887,494	+16.86	+48.05	+47.74
5	East South Central	24,237	20,504	20,994	229,285	156,192	+18.21	+15.45	+44.94
6	West North Central	44,400	45,897	37,798	485,235	338,499	-3.26	+17.47	+44.50
7	West South Central	40,604	39,185	35,179	435,809	310,690	+3.82	+18.42	+40.27
8	Mountain	15,175	13,595	12,830	154,802	116,853	+11.62	+18.28	+32.22
9	Pacific	47,824	49,596	48,080	503,530	369,388	-3.57	+6.06	+36.32
Total—United States		504,697	453,806	383,385	4,874,741	3,398,232	+11.21	+31.64	+43.45

States comprising the various regions are—Zone 1: Conn., Me., Mass., N. H., R. I., Vt.—Zone 2, N. J., N. Y., Pa.—Zone 3: Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va.—Zone 4: Ill., Ind., Mich., Ohio, Wis.—Zone 5: Ala., Ky., Miss., Tenn.

Zone 6: Iowa, Kan., Minn., Mo., N. D., S. D.—Zone 7: Ark., La., Okla., Tex.—Zone 8: Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo.—Zone 9: Cal., Ore., Wash.

# AND AVIATION INDUSTRIES



Wide World  
This light Zundapp motorcycle is equipped with a four-cycle, two-cyl engine.

## Growing Use of Motorcycles Seen at Recent German Show; Increasing Emphasis Placed on Comfort With Performance

Conclusive evidence that the motorcycle industry has shared in the remarkable industrial recovery made in Germany since the end of World War II was to be found at the recent Motorcycle Exhibition in Frankfurt. Nearly 450 German and foreign exhibitors presented their wares at the show, and it came to light that there are now 133 types of motorcycles being produced in Germany.

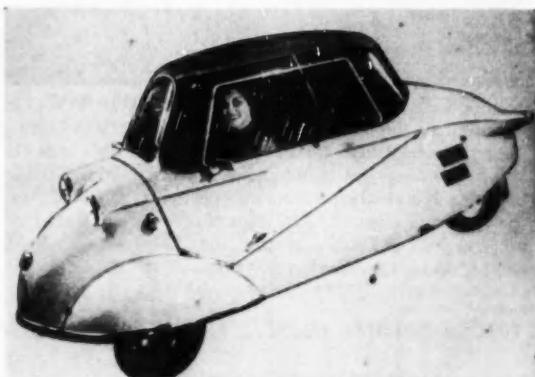
### Mopeds

German motorcycle production, like that in other European countries, is divided among three types of vehicles. The first category consists of bicycles with integrally built-in small engines,

known as "mopeds." They are equipped with front sprung fork, rear wheel chain drive (sometimes with V-belt drive), and light drum brakes. The engines have a cubic centimeter piston displacement of from 18 to 50. About 30 firms, among them Zundapp (see cut), are currently producing mopeds and were represented at the show.

### Motorrollers

A second class of vehicle, which attracted considerable attention at the show, has a completely enclosed engine and is known as a "motorroller." First developed in Italy, 39,000 of them were produced in Germany in 1952. One



Messerschmidt Kabinroller KR 175 has an aircooled 175 cu cm "Sachs" engine which develops nine bhp. It is capable of speeds up to 80 km/hr.

of the newest in the field to be seen at the Show was the Maico Motorroller. It has a two-cycle engine which furnishes 11 bhp at 5000 rpm.

Another particularly interesting vehicle in this general class was the Messerschmitt Kabinroller KR 175 (see cut), although it has the distinction of being a "three wheeler." Its body is enclosed and equipped with a plastic transparent cover which can be opened toward the side. It has ordinary motorcycle steering with rotary throttle, kickstarter, and tandem seating arrangement.

### Motorcycles

Indicative of the strength of the German economy is the fact that in 1952 approximately 350,000 new motorcycles were built. Most firms at the show exhibited new 200-250 cu cm two-cycle machines with an emphasis on greater riding comfort. Sprung rear wheel suspension, swing arm on the front wheel, hydraulic shock absorbers, adjustable levers, improved rests, and lights were the notable developments.

The DKW firm had on display Model RT 350 with a two-cyl engine of 350 cu cm piston displacement. The pistons work alternately up and down to give it a well-balanced run. The engine has a rated output of 18 bhp at 4500-5000 rpm.

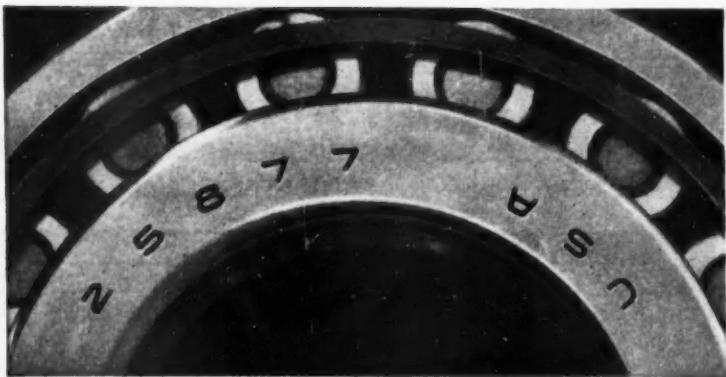
A second motorcycle with special features of interest at the show was the Triumph Cornet. It is equipped with a 200 cu-cm, two-cyl, two-cycle engine with an output of 10.1 bhp at 5000 rpm. Since two pistons work in unison in a common combustion chamber, only one exhaust port is used. It is said that this arrangement provides a good uniflow scavenging, produces a high output per cubic displacement unit, and makes for more silent performance.

### Goshen Silicone Plant

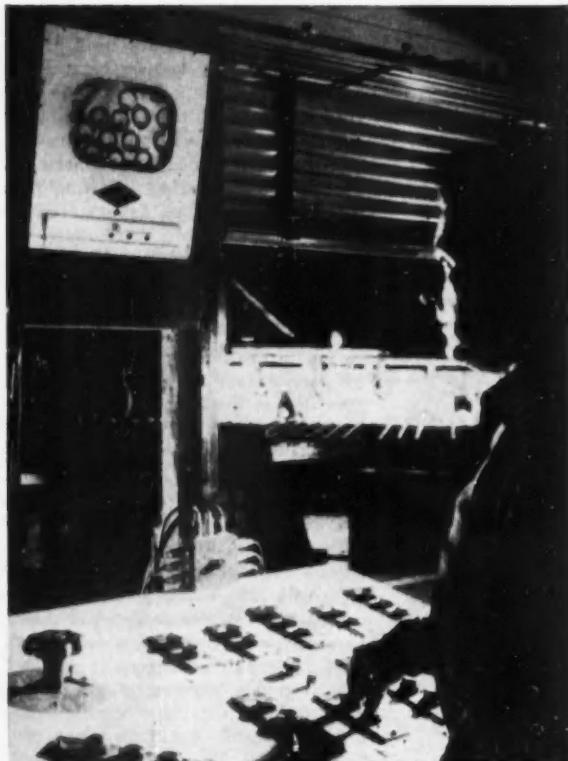
Construction of a new plant for the fabrication of precision silicone parts is under way adjacent to the main plant of Goshen Rubber Co., Inc., Goshen, Ind. Completion is expected during the first quarter of 1954.

Continued on Page 80

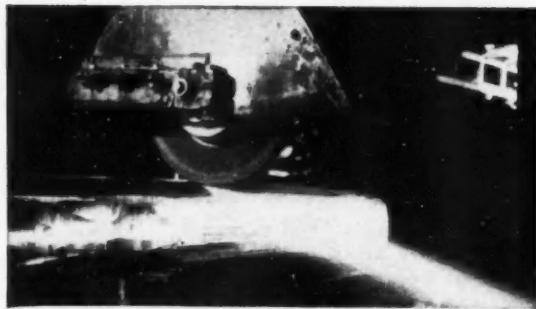
THE NUMBER 25877 on the bearing cone at right—coupled with 25821 on the cup—tells you it's a tapered roller bearing of a certain size used on rear wheels. It doesn't tell you anything about the quality of the bearing or the services that go with it. But the trademark "Timken®" stamped on the bearing does.



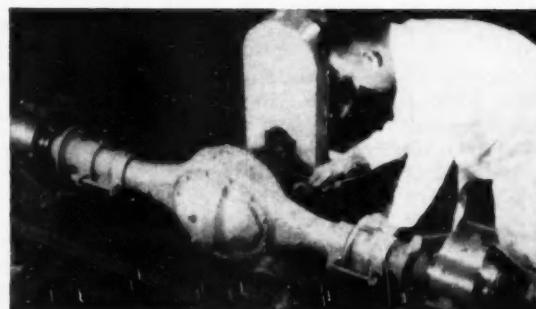
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WE WATCH OUR BEARING STEEL WITH TELEVISION EYES to prevent it from jamming-up in the furnace during the important slow-cooling process. We use ultra-modern machines and methods like this—in research and production—to make Timken bearings the No. 1 value for your car's moving parts, the vital zone.



WE'RE SO FUSSY ABOUT THE QUALITY of the steel that goes into a Timken bearing, that we make our own. The grinding operation shown above removes surface defects. It's only one of the many quality steps that make Timken steel the finest bearing steel ever made.



WE PUT OUR ENGINEERS TO WORK FOR YOU. One example: in this rear axle oscillating test we run bearings under abnormal load conditions. Result: valuable data that helps car makers get better performance from their Timken bearings. It's another reason for specifying "Timken" with the bearing number. For full value always use a Timken bearing cup with a Timken bearing cone. The Timken Roller Bearing Company, Canton 6, Ohio.

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# Men in the News



**Northrop Aircraft, Inc.**—John R. Alison was elected administrative vice-president.

Bendix Aviation Corp.—Charles Francis was elected to the board of directors.

Lockheed Aircraft Corp.—Leslie D. Meyers has been named plant manager at the Marietta, Ga., plant.

Motch & Merryweather Machinery Co., Cutting Tool Sales Div.—A. J. Snyder is now sales manager.

Firestone Tire & Rubber Co., Eastern Div.—C. L. Largent has been made manager.

Yellow Manufacturing Acceptance Corp.—Harold Rowe has been elected a vice-president, while Charles F. Sturtz, Jr., succeeds him as controller and assistant treasurer.

AP Parts Corp.—O. A. Roeger is now sales manager.

Lindberg Steel Treating Co.—Robert C. Cycon has joined the firm as chief cost accountant.

Baldwin - Lima - Hamilton Corp., Standard Steel Works Div.—Fred E. Greger has been chosen sales manager.

Dodge Div., Chrysler Corp.—Roy W. Vorhees was made supervisor of product planning and estimating.

B. F. Goodrich Co.—Dr. Frank K. Schoenfeld has been elected vice-president, research.

Birdsboro Steel Foundry and Machine Co.—B. A. Kline has been appointed sales manager.

Goerlich's—Byron H. Harris has been promoted to sales manager.



**Chrysler Div., Chrysler Corp.**—Walter E. Foraker has been made organization manager.



**New Departure Div., General Motors Corp.**—Robert T. Collins has become general sales manager.

E. W. Bliss Co., Canton Div.—M. E. Dorman has been appointed manager of materials for the purchasing department.

Westinghouse Electric Corp., East Pittsburgh Divs.—L. A. Kilgore has been selected as staff engineering manager.

Baker-Raulang Co., Baker Industrial Truck Div.—Russell A. Moore has been named field applications engineer.

National Lead Co.—Stephen A. Stoney is now assistant manager of industrial relations, and Albert L. Culbertson has become assistant director of personnel and industrial relations.

Rinshed-Mason Co., Refinishing Div.—G. A. Hall has been named West Coast representative, W. N. McGillevry was appointed to the Midwest area, and A. J. Oliver is now sales representative for the Eastern Region.

U. S. Rubber Co., Fisk-Gillette Tires Div.—J. J. Davison has become manager of truck tire sales. A. G. Richtmyer has been selected as district manager at Portland, Ore., and R. P. Buis has been named district manager at Kansas City.

New Departure Div., General Motors Corp.—Charles D. McCall has been chosen manager of automotive engineering in the Engineering Dept.

Kaiser-Willys Sales Div., Willys Motors, Inc.—S. E. Brennan is now manager of budget control.



**Dunlop Tire & Rubber Corp.**—Glenn H. Crawford was elected executive vice-president and treasurer.

**Wagner Electric Corp.**—Edward G. Holtzman has been elected assistant secretary and assistant treasurer.



American Smelting and Refining Co.—Robert S. Macfarlane and James A. Woods have been elected directors.

Continental-Diamond Fibre Co.—O. E. Anderson has joined the technical staff.

Euclid Road Machinery Co.—Robert J. Lenz is now manager of the Customer Service Dept.

Elgin National Watch Co., Abrasives Div.—Thomas A. Johnson has become supervisor of sales.

Wagner Electric Corp.—Truman L. King has become labor relations manager, while R. A. Weiskopf succeeds him as personnel relations manager.

Marbon Corp.—Robert Shattuck has been promoted to president, and H. Hunter Gehlbach has been elected secretary.

## Necrology

**Joseph A. Sweeney**, 63, vice-president and director of Kelsey-Hayes Wheel Co., died Nov. 26, at Bloomfield Hills, Mich.

**Lester J. Ross**, 63, president of Torrington Co., died Nov. 14, at Litchfield, Conn.

**Glenn H. Matthews**, 62, sales manager of metalworking machinery, Mattison Machine Works, died Nov. 14, at Rockford, Ill.

**Charles J. Koch**, 49, manager of engineering of the Medium Induction Motor Dept., General Electric Co., died Nov. 21, at Schenectady, N. Y.

**Grant L. Cook**, 59, chairman of L. A. Young Spring & Wire Corp., died Nov. 24, at Ann Arbor, Mich.

# What tolerances are practical for resilient gasket materials?



*you'll find the  
answer in this  
new 24-page  
gasket manual*

## 17 helpful sections, including:

- DESIGNING FLANGES FOR EFFICIENT SEALING
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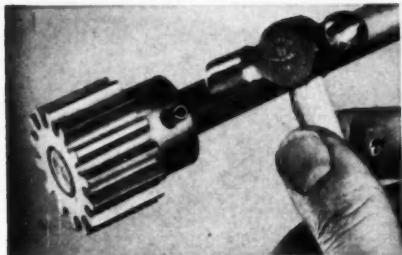
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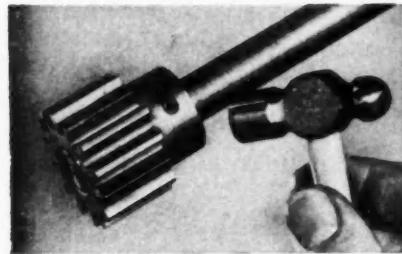
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No threading, peening or precision  
drilling with ROLLPIN

**Rollpin is driven into holes  
drilled to normal production-  
line tolerances.**



**It compresses as driven.**



**Rollpin fits flush . . . is vibration-proof.**

Rollpin is the slotted tubular steel pin with chamfered ends that is cutting production and maintenance costs in every class of industry.

This modern fastener drives easily into standard holes, compressing as driven. Its spring action locks it in place—regardless of impact loading, stress reversals or severe vibration. Rollpin is readily removable and can be re-used in the same hole.

\* \* \*

*If you use locating dowels, hinge pins, rivets, set screws—or straight, knurled, tapered or cotter type pins—Rollpin can cut your costs. Mail our coupon for design information.*



Elastic Stop Nut Corporation of America  
Dept. R16-125, 2330 Vauxhall Road, Union, N. J.

Please send me the following free fastening information:

Rollpin bulletin  
 Elastic Stop Nut bulletin

Here is a drawing of our  
product. What fastener  
would you suggest?

Name \_\_\_\_\_ Title \_\_\_\_\_

Firm \_\_\_\_\_

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City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

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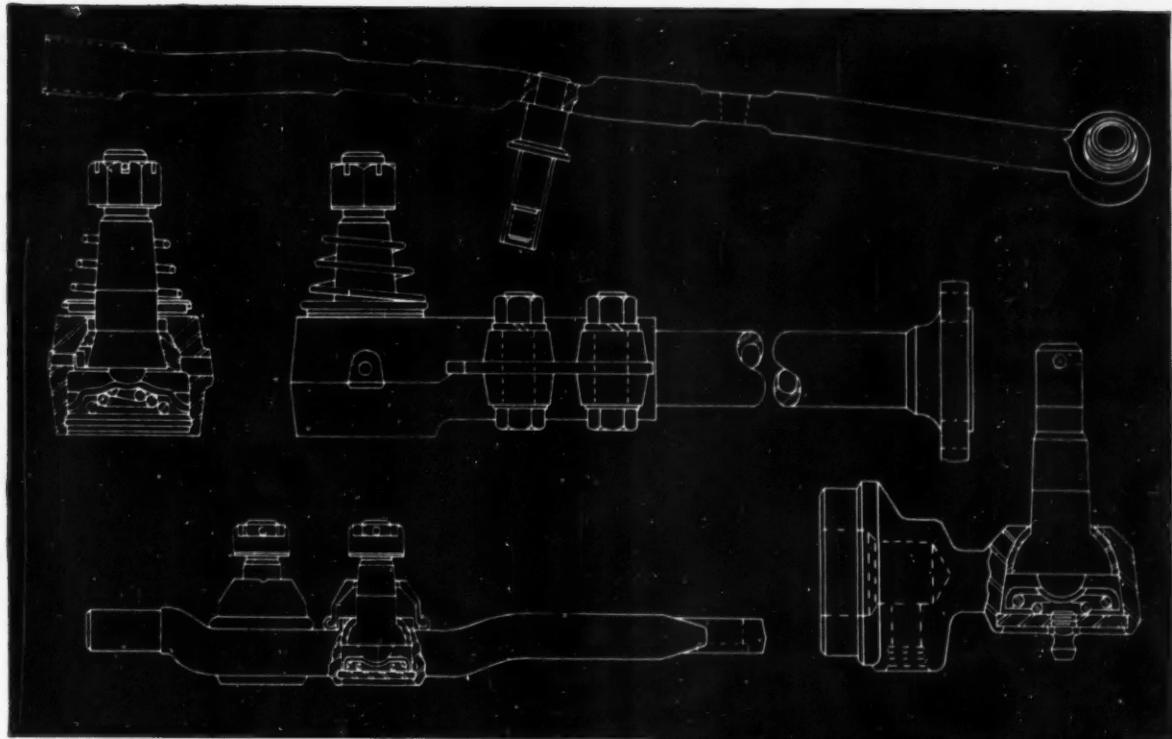
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Power steering for the new automobiles, trucks and tractors presents new steering problems—necessitates special and far more complicated steering linkage components.

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Thompson's "Steering Engineers" welcome the opportunity to work with all car, truck and tractor makers in solving their steering problems. Write, wire or telephone Thompson Products, Inc., 7881 Conant Ave., Detroit 11, Michigan. WA 1-5010.

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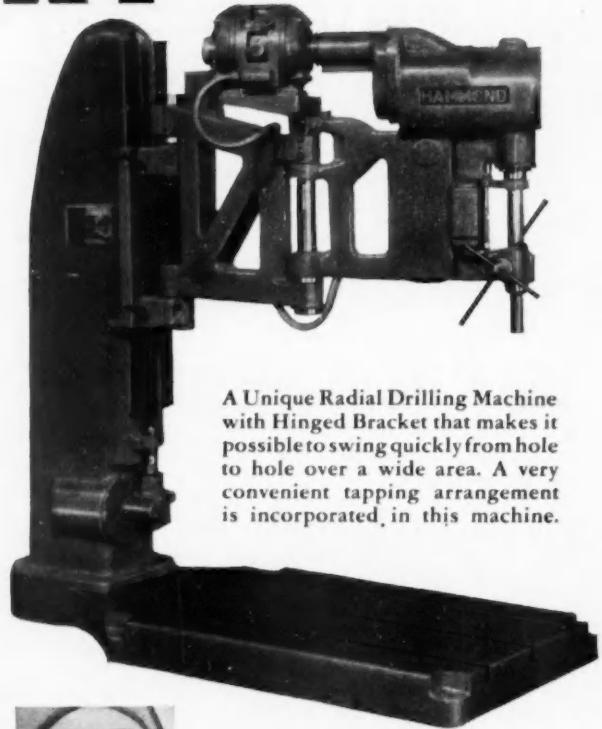
# FOOTBURT

machine  
tools  
for  
increased  
production

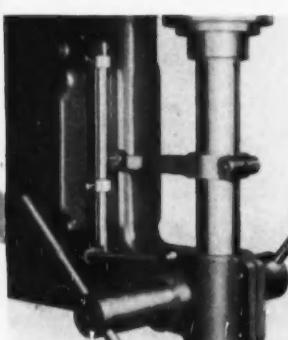
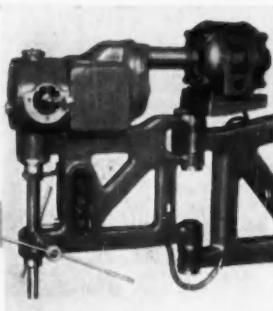
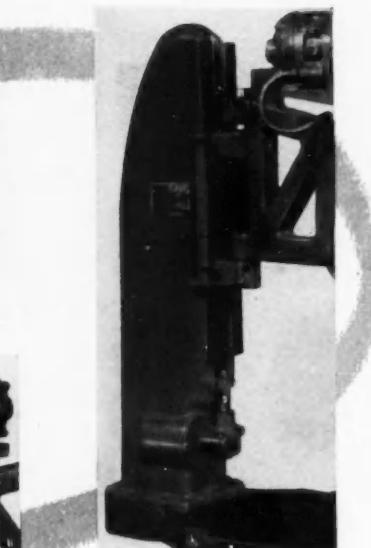
*engineered for production*

Here is a machine designed to perform light drilling and tapping operations at high speed with minimum of effort. Any one of six spindle speeds may be quickly selected and tapping is always instantly available without any adjustments to the machine. It makes an excellent choice for miscellaneous work on a large layout of varying size holes.

THE FOOTE-BURT COMPANY, Cleveland 8, Ohio  
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A Unique Radial Drilling Machine with Hinged Bracket that makes it possible to swing quickly from hole to hole over a wide area. A very convenient tapping arrangement is incorporated in this machine.



# FOOTBURT

*machine tools*

# Practical Approach to Head Gasket Specs

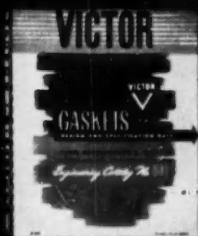
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## HEAVY-DUTY RANGE

## PASSENGER CAR RANGE

TYPES	STRUCTURES	SECTION
LM	.012 copper top .0094 steel layers .012 steel bottom	
VIC-2-FOLD	.013-.0145 copper top .045-.050 asbestos layer .015 steel bottom	
VIC-2-FOLD	.012 copper top .040-.045 asbestos layer .012 steel bottom	
W.I.	.0094 steel top .060-.065 asbestos .015 steel bottom .054 steel wire	
W.F.	.0085-.0095 copper top .050-.055 asbestos layer .0085-.0095 copper bottom .012 steel web flange	
D.O.	.0094 steel top .060-.065 asbestos .012 steel bottom	
V.R.	.0085-.0095 copper top .070-.075 asbestos layer .013-.0145 copper bottom .0094 steel VR flange	
S.O.	.0094 steel top .060-.065 asbestos layer .015 steel bottom	
C.T.	.040-.045 C.S. corbestos .0083 steel shim .040-.045 C.S. corbestos .0094 steel flanges	
VIC-2-FOLD	.0085-.0095 copper top .035-.040 asbestos layer .0094 steel bottom	
T.A.	.0077 steel top .015-.020 asbestos layer .0083 steel bottom	
S.C.	.015 or .020 steel	
C.F.	.060-.065 CP corbestos .012 steel flange	
D.O.	.0085-.0095 copper top .060-.065 asbestos layer .012 copper bottom	
C.F.	.060-.065 CP corbestos .0094 steel flange	
S.O.	.0094 steel top .060-.065 asbestos layer .0094 steel bottom	
S.O.	.0085-.0095 copper top .060-.065 asbestos layer .0085-.0095 copper bottom	
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COMPARATIVE RATINGS of 18 most commonly used head gasket structures, based on blow-by and burn-out factors.



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This chart with supplementary data gets you quickly to the special requirements and cost factors that influence final head gasket specifications. It eliminates time-taking search and study of gasket design that may be found unsuited to your application. It helps prevent over-sealing as well as under-sealing.

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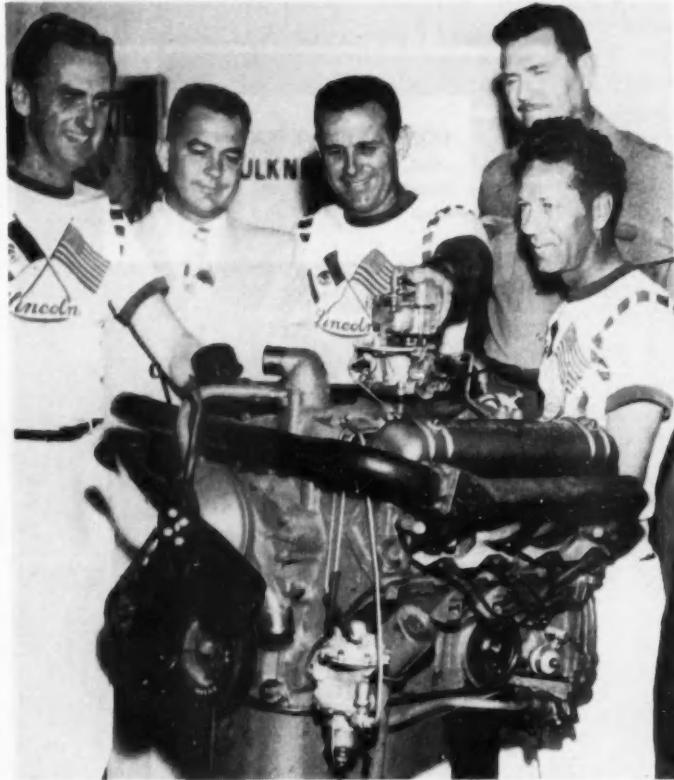
SEALING PRODUCTS EXCLUSIVELY

# Preparedness Pays Off

at

## PAN-AMERICAN RACE

Special Dispatch to  
AUTOMOTIVE INDUSTRIES



Pictured in the shop of Smith and Stroppe in Long Beach, Calif., where the winning Lincolns were prepared are (left to right) Clay Smith, Ray Crawford, Bill Stroppe, Frank Kurtis, and Walt Faulkner.



This Porsche car finished first in the light sports car class. The driver is Jose Herrarte of Guatemala. United Press photo.

### JUAREZ, MEXICO

LINCOLN Capri's setup in the Long Beach, Calif., shop of Clay Smith, duplicated their winning performance of 1952 by capturing the first four places in last month's 1934-mile Pan-American Road Race.

Lincolns, 1953 stock models, captured seven of the first ten places. Chrysler placed two cars in the first ten and Packard was tenth through disqualification of an Oldsmobile 88 driven by Jim Rathman, Miami, Fla.

Frank Ruppert, Pomona, Calif., Lincoln-Mercury dealer, who sponsored Stevenson in his two winning years, outlined the preparation made for him in advance of this year's race, starting right after the end of the 1952 event.

The winning car was sent over the course charting its curves, dips and other hazards, Ruppert said, and for the past two months the charting was stepped up on the basis of experience and study. In addition, Stevenson had as his co-driver Clay Smith, named mechanic of the year for the last two years.

Stevenson was accompanied by five tons of equipment, along the route. He used 22 tires in winning last year and the same number this year.

Ruppert said the average entry cost its sponsor between \$15,000 and \$20,000. He credited better preparation and better understanding of possible speeds on curves for the lower time posted this



First in the heavy sports class, Juan Manuel Fangio of Argentine won \$17,000 driving a Lancia. United Press photo.



C. D. Evans won in the light stock car class with a Chevrolet. United Press photo.



Ferrari driven by Umberto Maglioli as it crosses the finish line to take sixth place. It set a new lap record during the race. United Press photo.

year. The winner's top speed on straight-aways, he said, was 123 miles an hour.

Stevenson's win gave Ruppert a record of two wins and a fourth in the four years of the race. He sponsored Troy Ruttman in the 1951 event.

Of the 167 cars that left the starting line at Tuxtla Gutiérrez, Mexico, only 60 finished the race.

Owen Gray, John Fitch and Bob Korf were driving Chrysler New Yorkers with 285-hp engines in the heavy sports field. After traveling 120 miles, Gray went out the first day with transmission trouble. Fitch and Korf followed with the same mechanical ailment. Ray Crawford and Duane Carter, driving Lincoln Capris, were out because of broken valves. Other cars went out through various mechanical failures.

Carter, the "old pro" from Indiana, switched to a Kurtis Kraft that was started in the heavy sports class with Tony Betten-

## Leading Finishers

### HEAVY SPORTS CLASS

- 1—Lancia, Fangio, 18 hours 11 minutes flat\*
- 2—Lancia, Taruffi, 18:10:51
- 3—Lancia, Castellotti, 18:24:52
- 4—Ferrari, Mancini, 19:40:29
- 5—Talbot, Rosier, 20:11:22
- 6—Ferrari, Maglioli, 20:16:28†
- 7—Ferrari, E. Ruli, 20:16:28
- 8—Special, Miller, 22:48:29
- 9—Jaguar, Giron, 22:14:46

\* New record. Last year's winner, Karl Kling, had total elapsed time of 18:51:19.

† Karl Kling set record last year when he sped from Chihuahua City to Juarez in time of 1:44:21 for 233 miles. Maglioli streaked same distance this year in record time of 1:36:30. Kling's speed was 135 mph; Maglioli's 142 mph.

### HEAVY STOCK CLASS

- 1—Lincoln, Chuck Stevenson, 20:31:32
- 2—Lincoln, Faulkner, 20:32:56
- 3—Lincoln, McGrath, 20:33:30
- 4—Lincoln, Mantz, 20:33:30\*
- 5—Chrysler, Drisdale, 21:21:18
- 6—Chrysler, Russel, 21:34:28
- 7—Lincoln, Galvez, 22:18:44
- 8—Lincoln, J. Desoto, 22:27:01
- 9—Lincoln, Petrini, 22:38:28
- 10—Packard, Ehlinger, 22:34:40

\* Mantz set a record of 1:59:34 in 1952 from Chihuahua City to Juarez. He broke record this year in time of 1:55:39.

### LIGHT SPORTS CLASS

- 1—Porsche, Herrarte, 23:57:04
- 2—Porsche, Segura, 24:18:25.

Borgward driven by Hans Hugo Hartmann developed mechanical trouble 7 seconds late from Chihuahua and was disqualified. Total time 22:13:19. Hartmann had lead of approximately one hour and half when disqualified.

### LIGHT STOCK CLASS

- 1—Chevrolet, Evans, 24:28:21
- 2—Ford, Patterson, 24:58:55
- 3—Ford, Cahalen, 25:03:49
- 4—Chevrolet, Yantis, 25:09:51. (lap winner)
- 5—Hudson, Eckhart, 25:17:15



Drivers escaped with slight injuries when this Lincoln rolled over six times. Note crash bar over driver's seat.



Chuck Stevenson of Milwaukee at the wheel of his Lincoln.  
United Press photo.



Most cars used air scoops on the front brakes. The one shown here is installed on a Lincoln.

hausen at the wheel. Bettenhausen became ill the second day and Carter started the day's running. A dead battery caused Carter to stop and buy a new one while the clock was running on his time report. He arrived at the Mexico City finish line over the allowable time and was disqualified.

Fading brakes caused numerous cars to crash into mountains, or run off highways. A majority said they would roll into the finish line with little or no sign of brakes.

Three of the drivers were killed. Felice Bonetto disregarded warning signs and hurled his Lancia V-6 into a dip in the town of Silao, Guanajuato. He received fatal injuries when the speedy Lancia struck a lamp post as it went out of control against the concrete lamp standard. Bonetto, one of Italy's famed drivers, was leading when he crashed.

Giuseppe Escontuzzi and Antonio Stagnoli, both of Italy, were rolling through the mountains between Oaxaca and Puebla when their Ferrari blew a tire, swerving the car into a mountain. Escontuzzi was killed instantly and Stagnoli died later in a hospital at Oaxaca. American drivers said the danger is part of any race and that no roads designed for motorist travel are marked for racing. Proper preparations for such a race requires a careful check of the dangers, the drivers insisted.

All winners, including the heavy sports and stock, broke records established last year. Chuck Stevenson, winner last year and the only competitor to repeat as a first place winner two years in a row, shaved nearly 45 minutes off the total time. Stevenson had a total time of 21:15:38 in the 1952 running. This year his time for first place was 20:31:32. The other three Lincolns, driven by Walt Faulkner, Jack McGrath and Johnny Mantz, also broke last year's record.

Technical officials who ousted Rathman, piloting a car sponsored by Dick Doane, Dundee, Ill., said that he was disqualified for what they termed "illegal alterations of the engine." The official explanation said "Rathman's car had an oversized head and it had polished intake and exhaust manifolds, porting and relieving to change valve angle and pressure of valve springs, alterations to the jets and other parts of the carburetor from the series and catalogue specifications."

All other cars in the heavy stock, light sports and light stock categories passed technical inspection. (Turn to page 90, please)

## *Design Features of the*

# Douglas DC-7 Airliner

THE DC-7, newest commercial transport in the series of aircraft built by the Douglas Aircraft Co. Inc., has a top speed of more than 400 mph and a cruising speed of 360 mph. It is powered by four Wright R-3350 turbo-compound engines capable of developing a combined total of 13,000 hp for take-off with 115/145 fuel, without the use of anti-detonant injection.

An especially contoured Hamilton-Standard 34E60 four-bladed propeller is required to absorb the large amount of power produced by the Wright engine. Rather than sacrifice passenger comfort for an increase in performance, the propeller diameter was retained at the 13½-ft value of the DC-6Bs. An increase in this diameter on the DC-7 would have raised the sound level within the passenger cabin. Consequently, the distance from the propeller tip to the fuselage was kept as great as practicable. As an improvement in propeller control, the new manually-operated gate-type control, is utilized on the cockpit control pedestal for propeller reversing.

The DC-7 retains basically the same wing, fuselage (except for length), and tail design as used on the DC-6B. Changes to the wing include the use of larger front spar and center spar caps; the redesign of both the inboard and outboard nacelles necessitated by the large increase of thrust and torque, and the increase in weight of the power egg; and on DC-7 aircraft effective with fuselage No. 473, a new front spar landing gear fitting. The inboard nacelles have been lofted to suit next size larger landing gear tires.

Approximately 90 per cent of the primary structural nacelle skins aft of the firewall, and the firewall itself are made of titanium. The use of titanium in the structure of the DC-7 nacelles represents the first time this new material has been used to any extent on a commercial airliner. Titanium not only provides very desirable strength-versus-temperature characteristics for engine nacelle structure, but also, through its use in this application, a weight saving of approximately 260 lb results.

(Continued on next page)

## CONDENSED PERFORMANCE SPECIFICATIONS OF DC-7

### Specific fuel consumption at maximum cruise power

Based on shaft hp (lb per hr) . . . . .	0.41
Adjusted for jet thrust hp (lb per hr) . . . . .	0.41

### Miles per lb at 20,000 ft

1.1 $V_{L/D}$ at 90,000 lb (miles per lb) . . . . .	0.154 at 285 mph
1.1 $V_{L/D}$ at 90 per cent windmilling take-off weight (miles per lb) . . . . .	0.129 at 307 mph

### Maximum cruise at 90 per cent windmilling take-off weight (miles per lb) . . . . .

0.113 at 344 mph

### Fuel capacity (gal) . . . . .

4,512      5,512

### \*Approximate range with maximum cruise power at critical altitude and standard capacity payload (statute miles) . . . . .

Take-off weight (lb) . . . . .	2,210      2,830
Fuel capacity (gal) . . . . .	113,750      120,600
Payload (lb) . . . . .	4,512      5,512
Block speed (mph) . . . . .	16,970      16,970

### Range with reduced cruise power (statute miles) . . . . .

2,270      2,910

Power . . . . .	1,700      1,700
Take-off weight (lb) . . . . .	113,750      120,600
Fuel capacity (gal) . . . . .	4,512      5,512
Payload (lb) . . . . .	16,970      16,970

Block speed (mph) . . . . .

327      327

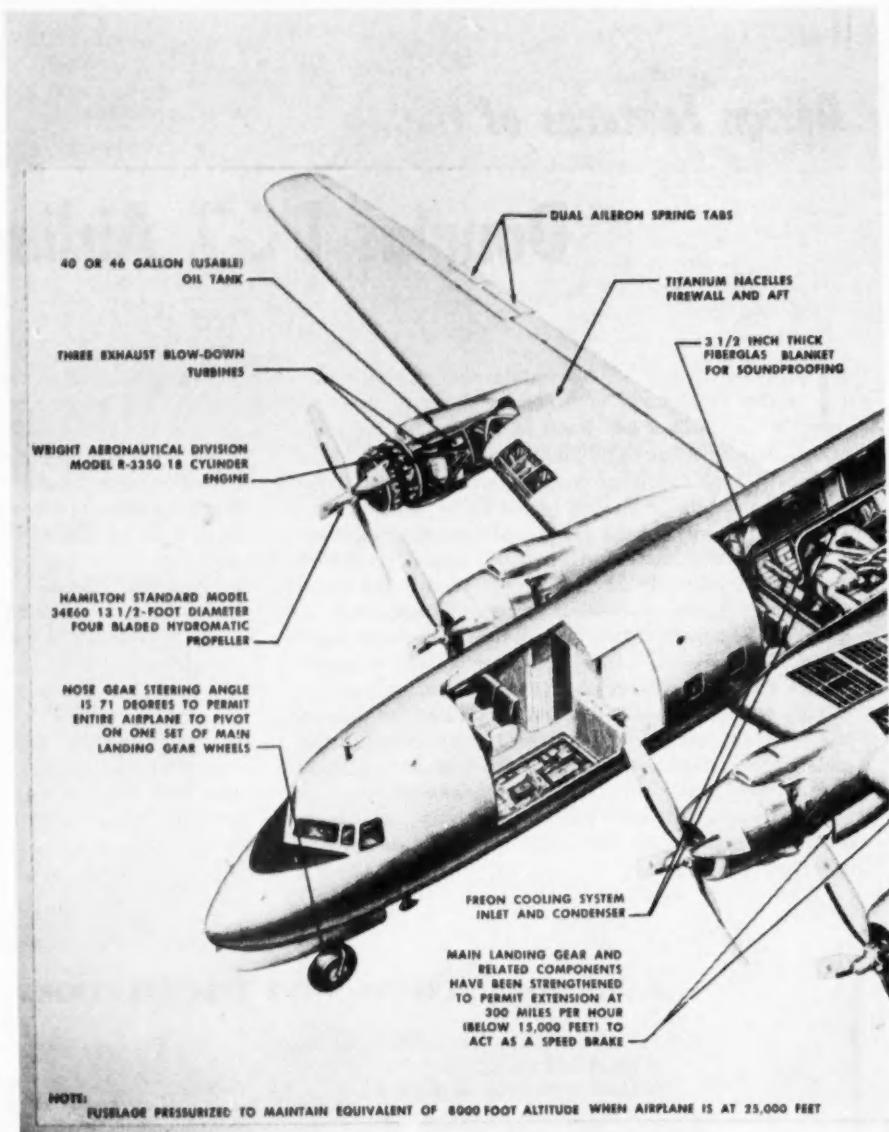
\* Ranges will vary slightly with interior arrangement due to effect on weight empty. Range allows for reserve of 300 miles, plus one hour and five per cent fuel markup.

Other changes made in the DC-7 wing are the incorporation of a mechanical trim tab in the left aileron to provide a finer adjustment for lateral trim, and the lengthening of the ground adjustable tab.

The DC-7 fuselage is designed to maintain an 8000-ft cabin altitude at 25,000 ft. Cabin window panes are  $\frac{3}{8}$  in. thick to withstand this pressure. The two superchargers are capable of providing 112 lb of air per minute.

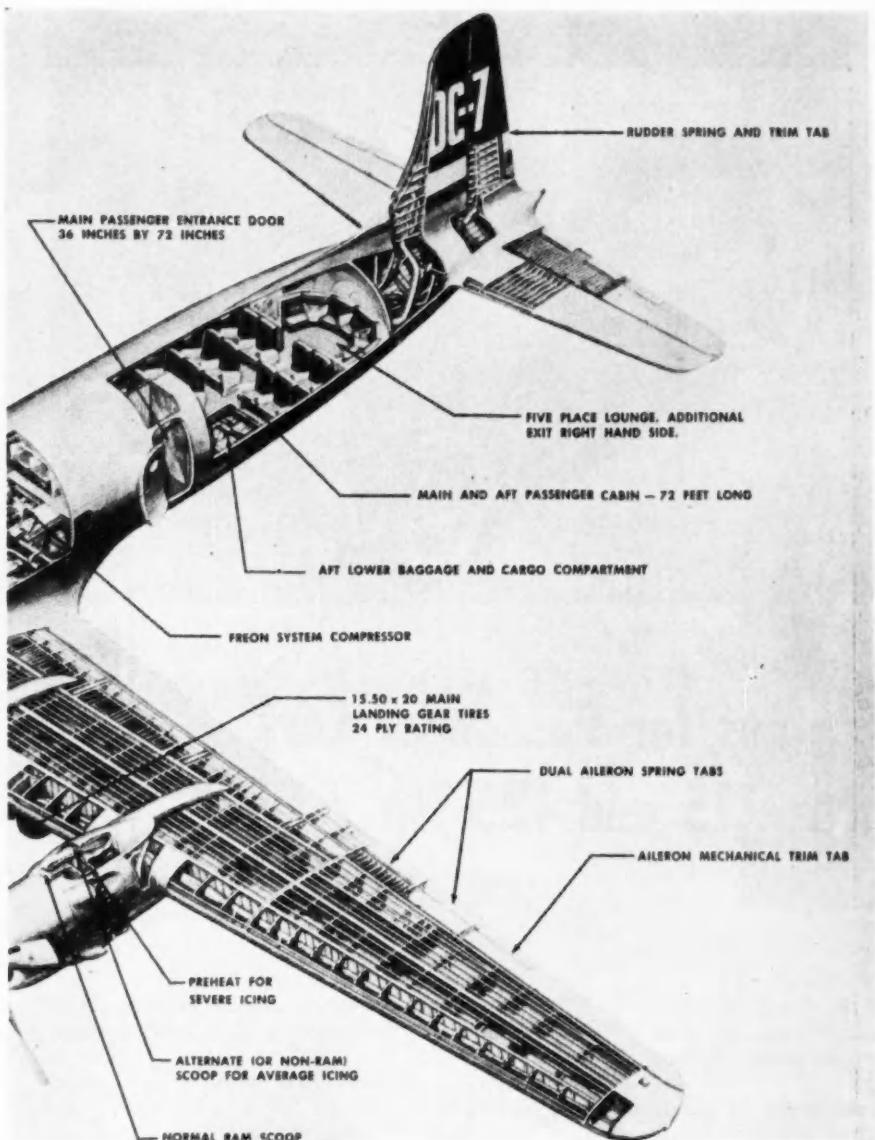
A newly-designed non-icing air induction scoop is utilized in addition to the standard scoop features used on the DC-6 and DC-6B. On the improved DC-7 system, the engine can draw air from three different sources; the normal ram scoop similar to the DC-6, an alternate or non-ram scoop, or through the engine section as preheat. The alternate scoop is placed back of the normal ram air scoop and, because of its design and location, ice particles and water droplets are deflected by the scoop forward of the air intake. The alternate scoop makes the use of engine preheat necessary in only the most severe icing conditions. A source of preheat is available, however, from beneath the cowling. If master control carburetor preheat is required, the scoop permits preheated air and alternate ram air to be mixed to provide the desired degree of heat.

An improvement in the DC-7 is the use of the main landing gear as a speed brake. Under previous conditions of operation, due to the clean aerodynamic design of the airplane, the method of descent had to be selected from one of two alternatives: it would be necessary to begin the descent at a great distance from the airport to keep the glide angle shallow and prevent exceeding the design speeds, or to continue at cruise altitude to a position nearer the airport and make a slow speed, gear-down descent. The long shallow descent removes an appreciable amount of over-the-weather comfort for the passenger since the airplane is subjected, for a



CUTAWAY VIEW OF THE

longer period of time, to the rougher air conditions that prevail at the lower altitudes. With the steep but slow descent, block-to-block times are increased. On the DC-7, the main landing gear and related components such as struts, links, attachments, landing gear doors, etc., have been strengthened to permit extension at 300 miles per hour (below 15,000 ft altitude) or at main landing gear placarded speed above 15,000 ft (285 TIAS at 25,000 ft). The drag of the clean airplane is almost doubled by extending the main gear, thus allowing a higher speed and steeper descent without sacrifice of either block-to-block speed or passenger comfort. A handle on the control pedestal is used for extending the main landing gear as a speed brake. Operation of the speed brake handle, which essentially ties in to the uplatch mechanism, allows the main landing gear to



### DOUGLAS DC-7 AIRPLANE

drop free without hydraulic pressure. Extension of the nose gear, or retraction of the main landing gear is controlled by the conventional landing gear handle. When the landing gear is not extended as a speed brake, landing gear operation is controlled by the landing gear control handle which overrides the speed brake control at all times.

The oil system incorporates either a 40- or 46-gal oil tank in each nacelle. The use of a 46-gal tank provides sufficient oil to maintain the required fuel-to-oil ratio without the use of an auxiliary oil system, with the maximum fuel quantity of 5512 gal.

Goodyear brakes, as installed on the DC-7, have 12 spot locations acting on triple discs. This results in six sets of 12 spots acting on three discs which are keyed to rotate with the wheel. Brake pressure is applied to

the assembly through an annular piston and pressure plate.

The nose gear is designed to turn far enough to permit the entire airplane to steer or turn about one set of main landing gear wheels. To accomplish this, the steering angle was increased to approximately 71 degrees. In addition, the nose wheel steering power of the DC-7 has been increased to provide more powerful control over the airplane during the more extensive taxiing operations which may be required with future airport expansions.

The DC-7 air conditioning system incorporates a Douglas-designed airborne Freon refrigeration system, if desired, which can be used in flight to supplement the regular air cycle cooling system from the cabin superchargers. When the airplane is on the ground, the Freon system can be operated from a ground-power electrical supply to keep the cabin cool, or to pre-cool (if the airplane has been parked for a long period of time) prior to the loading of passengers. Thus, passengers leaving an air conditioned airport

terminal and boarding a DC-7 equipped with a Freon system, will experience no discomfort while waiting to become airborne.

The Freon system weighs a little over 500 lb, however, its ability to cool, clean and dehumidify the air makes the incorporation of such a system very worthwhile, particularly in the summer months. The system is specifically designed to allow any combination of the major components to be removed should the airplane be operated for extended periods in an area where the additional refrigeration is not required.

#### New ACP Detroit Address

The Detroit office of American Chemical Paint Co. has moved to 10225 W. McNichols Road, Detroit 21, Mich.

*Designed for a broader, lower effect, the front bumper has been curved farther around the fenders of the new models. Other modifications include the grille, bumper guards, parking lamps and hood ornamentation. The model shown is a two-toned, four-door sedan in the 210 series.*



## Chevrolet Engines for Passenger Cars Upped to 115 and 125 Hp

**M**ORE power, an extension of the automatic transmission option to all cars, and design revisions both inside and out of the three series highspot the 1954 Chevrolets.

A new entry in the lineup of 13 passenger car models is a utility sedan in the One-Fifty or lowest priced series. This body, which replaces the former business coupe, offers 54 cu ft of storage space. An eight-passenger station wagon brings to five the number of Bel Air body types. The company has also announced that convertibles will be offered only in this series which was brought out by Chevrolet a year ago.

In addition to optional power steering, introduced last year, Chevrolet offers a "package" option of electric front seat adjustment and front window lifts. Power brakes have been added as an optional feature on Powerglide-equipped cars.

Again in 1954 there will be a choice of two engines, each more powerful than its 1953 counterpart. The 115-hp Blue Flame engine powers gearshift models. An engine of 125 hp is used with the Powerglide automatic shift, now available on all cars, including the sedan delivery.

Other chassis advances cover improvements in the clutch of gearshift models, a longer, deeper-toned and sound deadening muffler and nylon rear spring inserts to eliminate the necessity for lubrication.

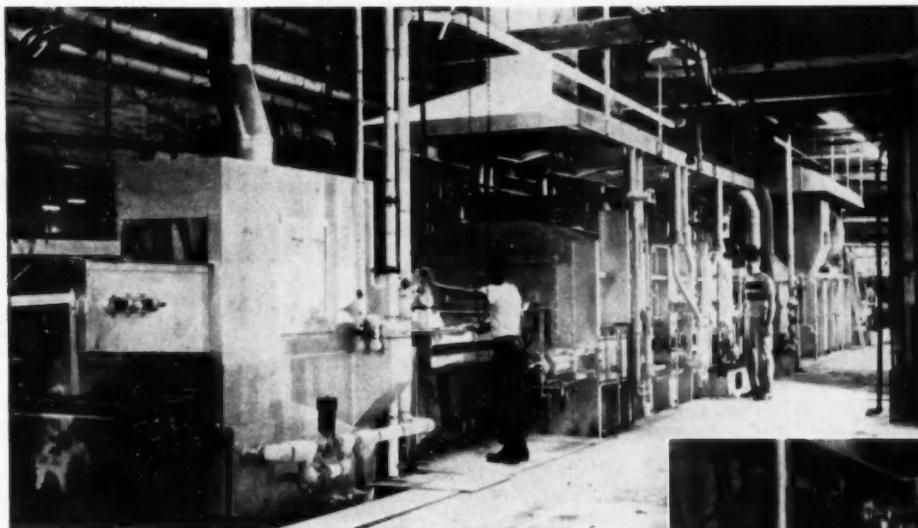
The Powerglide automatic transmission is continued with modifications for improved high speed acceleration.

The engine in the Powerglide option is the valve-in-head six cylinder unit with 125 hp available at 3800 rpm. New high-lift cams and improvements in the valve mechanism make possible increased breathing efficiency at the same compression ratio of 7.5 to 1.

Improvements in the valve mechanism were adopted not only to conform with the higher cam lifts but to make all parts stronger and more durable. Hydraulic valve lifters have been redesigned for more reliable operation. A composite camshaft drive gear, having an aluminum alloy ring, a synthetic rubber insulator and cast alloy iron hub replaces the plastic and fabric gear with steel hub. XCR alloy steel is utilized for exhaust valves for greater strength at high temperatures and resistance to scaling and pitting.

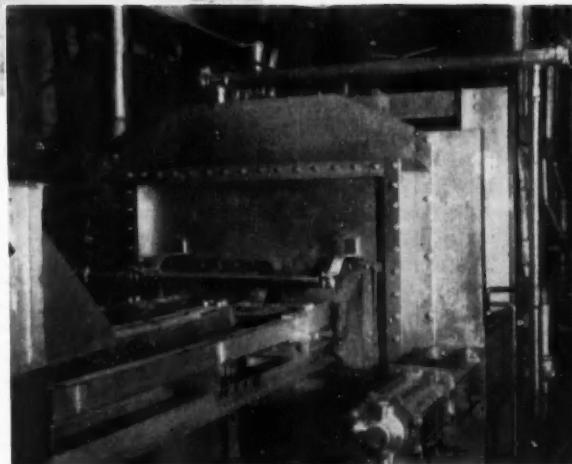
A new cast alloy iron camshaft in the 125 has greater resistance to twisting at higher speeds. More strength is built into rocker shafts by a reduction in the diameter of attachment holes at each end. A cast alloy iron distributor drive gear replaces the former steel type to reduce wear on the camshaft.

To allow for heavy acceleration demands during warm-up, the thermostatic spring in the automatic (Turn to page 86, please)



Overall view of the new automatic furnace line at Standard Pressed Steel. The 110 ft long unit has an annual capacity of over 8 million lb of fasteners.

Screws leaving the wash station drop onto a steel trough shaker that feeds the radiant tube heat-treating furnace. Inside the furnace, at 1600 F, parts travel 30 ft on a wire mesh belt conveyor.



## Automatic Furnace Line For Heat Treating Aircraft Screws

**A**s part of a \$10 million expansion program, Standard Pressed Steel Co., Jenkintown, Pa., has installed an automatic furnace line which heat-treats threaded fasteners for aircraft at a rate five times faster than the former method. This 110 ft long furnace line, which can process up to 1400 lb of screws per hr, was one of the major steps toward a production line which will eventually be fully automated from bar stock through inspection.

Screws and bolts,  $\frac{1}{4}$  in. to  $1\frac{1}{4}$  in. in the 8740 family of steel, manufactured to AN specifications, are brought to the hardening line in bins, via lift trucks from nearby machining areas. The bins are identified and segregated in a small storage area and are then dispatched through the heat-treat line.

At the beginning of the line, the lot is counted by means of a scale. This scale is so calibrated that when 50 screws of a given lot are placed in the balance pan, while the loaded bin rests on the weigh stand, the scale dial indicates directly the number of screws in the lot. The count is immediately sent to the shipping department so that an order for the particular lot of fasteners can be pulled and processed while the lot is being heat treated. The company will eventually install telescribing stations both at the weigh station and in shipping to transmit this information.

Bins of screws are then dumped from the weigh stand to a short section of a shaker-type conveyor which feeds the fasteners into the first wash. Here, on a steel belt, the screws go through a hot alkali rinse that removes accumulated oil and other foreign matter. Coming out of the wash, the cleaned screws drop onto a steel-trough shaker conveyor which carries them to the hardening furnace.

The hardening furnace, which is some 30 ft long and requires the bulk of the 2700 cu ft of gas consumed hourly by the entire line, brings the fasteners up to a temperature of 1600 F. To obtain the inert atmosphere for the heat-treat operation, SPS installed an auxiliary gas-cracking unit. The cracker, which uses propane gas, can be set to derive the exact amount of carbon recovery desired. Actually, with the gas cracker, the hardening furnace can be operated as a carburizer. Leeds & Northrup instruments control the heat-treating operations.

When the heat-treating cycle is finished, the parts drop rapidly into an eight-ft deep quench pit. A special type quenching oil is used to obtain the proper hardness. Over 5000 gal of quenching oil are recirculated through a cooling tower located on the plant roof. Oil re-enters the quench tank through jets which

(Turn to page 132, please)

## 1954 MERCURY ENGINE

### Mechanical Specifications 90-deg V-8 with overhead valves

Bore (in.)	3.62
Stroke (in.)	3.10
Displacement (cu.in.)	256
Compression ratio	7.5 to 1
Bhp (max.)	161 @ 4400 rpm
Torque (lb ft) (max.)	238 @ 2200-2800 rpm
No. main Bearings	5

An entirely new model with a transparent roof, a new 161 hp overhead valve V-8 engine and a new type ball-joint front suspension feature the Mercury for 1954. Improved body styling and more luxurious interior trim combinations also highlight the new line.

Mercury for 1954 is offered in two series with a total of eight models. The custom series includes a two-door sedan, four-door sedan and sport hardtop coupe. The Monterey special custom series offers a four-door sedan, hardtop, convertible, the Sun Valley and four-door station wagon.

The Sun Valley, a Mercury Monterey hardtop, is the new model addition for 1954. It is characterized by a transparent plastic roof, the first of its kind in an American production car. The front half of the roof is a green tinted plexiglas.

Appearance changes throughout the line include restyled rear quarter panels, new wrap-around bumpers and a new front grille, combined with new ornamentation on the side.

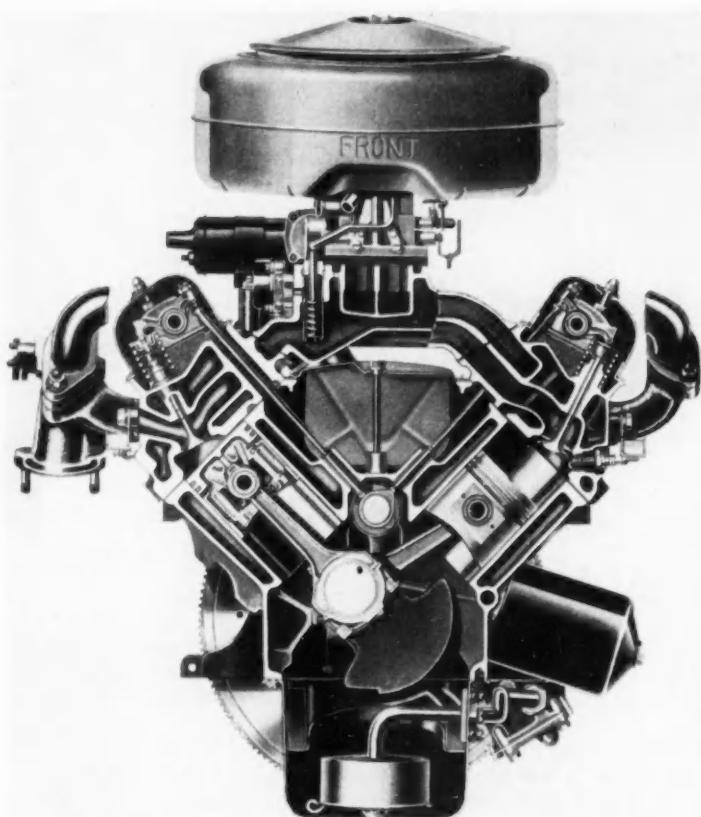
A completely new overhead valve V-8 engine powers all 1954 models. With a bore of 3.62 in., stroke of 3.10 in., and piston displacement of 256 cu in. it develops 161 hp at 4400 rpm.

In designing the engine, emphasis has been centered upon structural rigidity. This is exemplified in the rugged cylinder block which is short and stiff, with the parting line carried well below the center line of the crankshaft. It has five main bearings with heavy ribs extending upward into the main structure.

The precision-molded alloy iron crankshaft is shorter, stiffer, and 20 lb lighter than on the former engine. It has an increase of 160 per cent in journal overlap, resulting in exceptional torsional rigidity.

Although all reciprocating and rotating elements are balanced to close limits as before, 1954 Mercury V-8's will be mass-balanced after final assembly in enormous dynamic balancing machines recently installed in

# Mercury Has New Overhead Valve Engine



Here is a traverse cross-section of the 1954 Mercury engine, emphasizing structural rigidity, and over-and-under intake manifold design.

Cleveland for this purpose. Final balance at both ends of the assembled engine should make for exceptionally smooth operation at all speeds.

Certain general design features may be briefly summarized as follows: the engine is of modern, short-stroke, low-friction design, contributing to high performance, with greater economy and long life; overhead valve rotators are standard equipment; integral valve guides, bored in the head, assure longer valve life by reducing critical exhaust valve temperatures by at least 100 F; compact, wedge-shape combustion chambers are provided for high turbulence and low energy loss; built-in full flow oil filtration provides better protection for engine bearings; intake and ex-



**Mercury Monterey Sun Valley, a sports coupe with transparent plexiglas replacing steel over the front section of the roof.**

haust valves are provided with a Neoprene shroud to prevent excessive oil consumption through valve guides; in addition, the engine is fitted with an externally mounted oil pump.

Connecting rod caps are forged individually to permit highest strength with lowest weight. The large bore permits use of separate connecting rod bolts. The bolts have a cam-shaped head, fitting in an eccentrically counterbored pocket to prevent turning. Eccentric counterboring, moreover, is arranged to avoid weakening of the rod section by the conventional notch at this point.

The intake manifold is of T-section design with over-and-under passages, providing balanced flow and even short-path distribution of mixture to the combustion chamber. Short, compact rocker arms are precision-molded of pearlitic malleable iron.

The carburetor developed for the Mercury V-8 has many unique features, including four venturis to provide for extra breathing capacity. Although the use of four venturis is not new, the method of vacuum control of secondary venturis is said to be distinctive. It also includes dirt-proof internal and external vents to assure instant starting. The best features of the former carburetor have been retained, including a dual-float, concentric fuel bowl mounted on insulating stilts, directly over the venturis. The new low-restriction

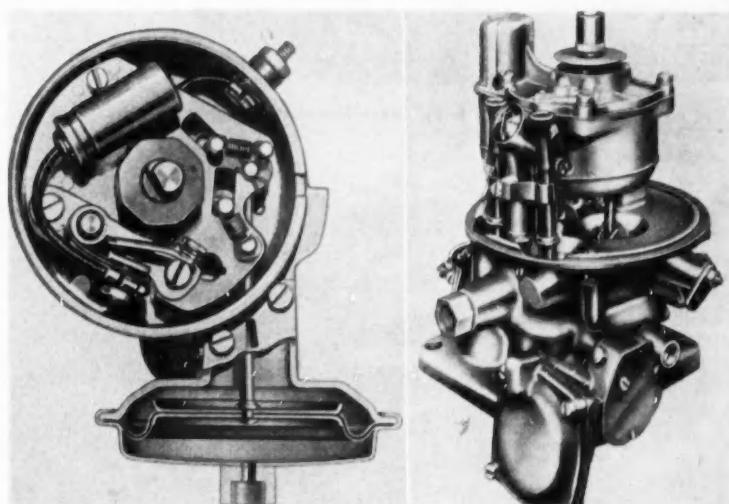
oil bath air cleaner encloses the fuel bowl, forming the carburetor air horn.

Vacuum operation of secondary venturis provides precise, automatic adjustment to engine operating conditions. Throttle plates below the primary venturis are operated by the accelerator pedal for all normal speeds and loads. However, air flow through these venturis creates the vacuum which is applied to a diaphragm for controlling secondary throttle plates.

Whenever power demands exceed the breathing capacity of the primary venturis, this vacuum opens the secondary throttle plates to the position that will admit the right amount of additional air and fuel. Entirely divorced from the accelerator linkage, functioning of the secondary throttle plates depends only on the amount of air flowing through primary venturis.

Another of the distinctive features of the carburetor is a new anti-percolating device that permits fuel vapors to pass out harmlessly, leaving the intake manifold dry whenever the engine is idling or stopped after a hard drive.

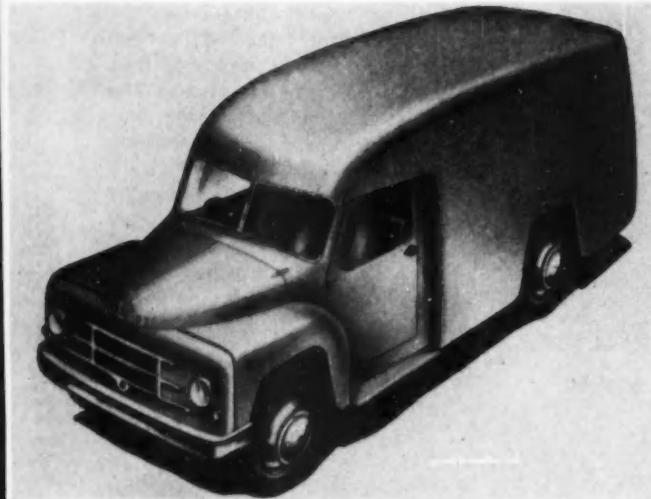
A supersensitive diaphragm in the vacuum distributor control aids in meeting the increased low-speed spark advance requirements, providing 15 per cent more torque than would have been possible with the previous type of control. (Turn to page 88, please)



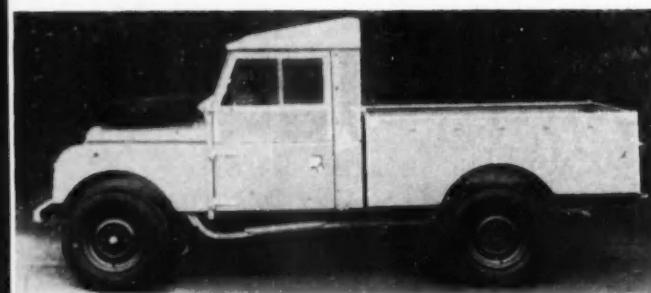
**At left is shown super-sensitive diaphragm in the new vacuum distributor control which meets increased low-speed spark advance requirements. At right is a 3/4 rear view of 1954 Mercury four-venturi carburetor.**

# New British Vehicles at Glasgow Show

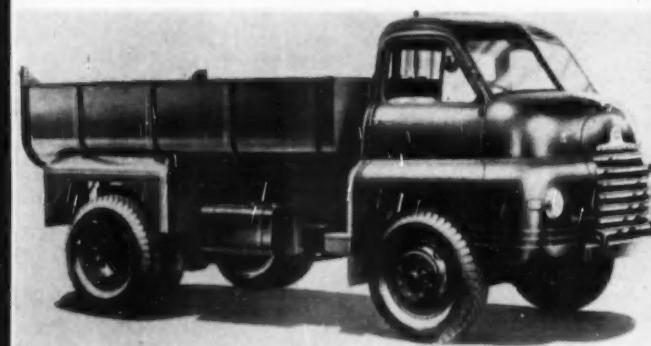
By David Scott



Seddon 1½-ton van. Low mounting of the three-cylinder Diesel provides improved close-up visibility.



Land Rover with new pickup body. Note mounting of spare tire.



Big Bedford seven-ton dump truck which is offered with either gasoline or Diesel power.

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GLASGOW, SCOTLAND

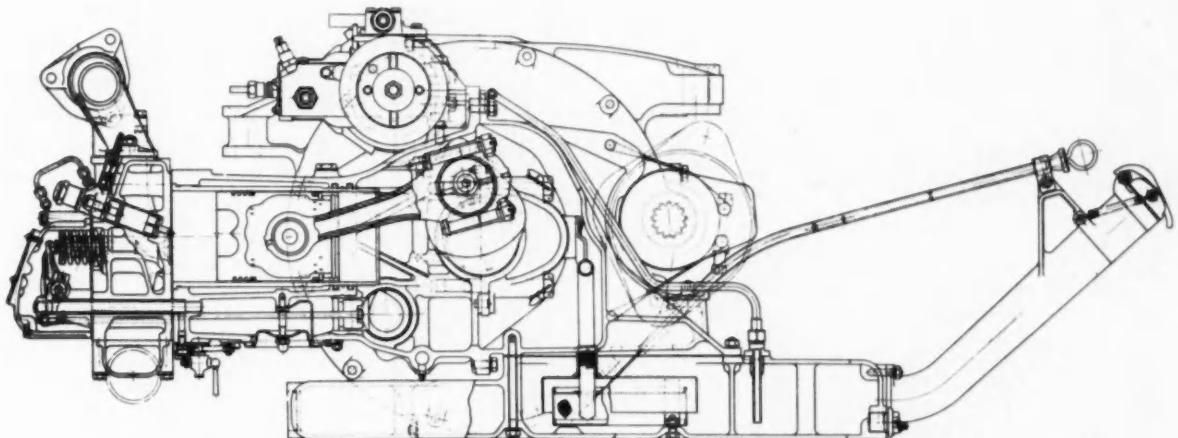
HE Scottish Motor Show in mid-November, embracing both automobiles and transport vehicles, provided the only opportunity this year to see new British commercial models under one roof. In contrast to the manufacturers' exhibition held in London biennially, the show at Kelvin Hall, Glasgow—the second since the war—was staged only by Scottish agents and dealers. This meant that the same truck or bus might be found on more than one stand, while some makes and models were absent entirely. However, most new developments in British road transport were represented, and the display gave a good indication of design and production trends, and of the expanding variety of basic models that are being made.

The popularity of Diesels continues, and an increasing number of makers are now offering the option of gasoline or oil engines. Perkins leads the field for Diesels, and at the show no fewer than 68 of this company's units, in vehicles from 1¼- to 8½ tons rating, were exhibited on 26 different stands. Semi- and full-forward control is another growing practice, and is extending to the lighter vehicles.

Passenger car styling and comfort is featured in the Commer light pickup. The all-steel cab, body and underframe are of welded, integral construction aimed at rigidity, weight reduction and elimination of rattles. Independent front wheel suspension is by coil springs and double support arms, with a pair of



Comet light pickup truck which features integral body and frame construction.



**Transverse sectional view of the six-cylinder Diesel used in the A.E.C. Monocoach.**

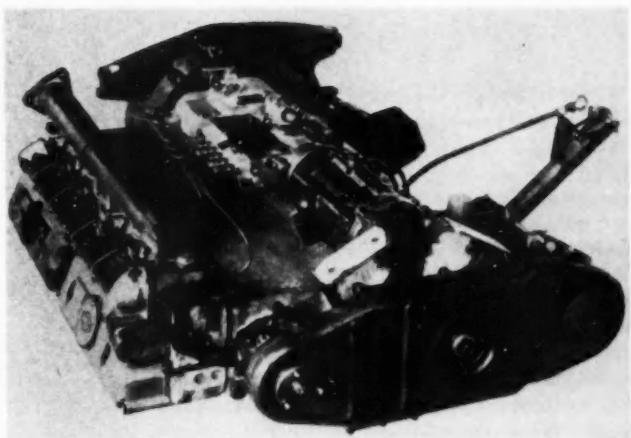
semi-elliptic springs used at the rear axle.

Its four-cylinder side-valve engine develops 37½ hp at 4200 rpm. Transmission is through a dry clutch, four-speed synchromesh transmission with steering column control.

Another new Commer lightweight is a 1½-ton panel truck with full-forward control. Power is by a 50 hp four-cylinder side-valve engine of 3.19 in. bore and 4.3 in. stroke. Cylinder bores are chromium plated etched for oil retention.

Seddon also has brought out a new 1½-ton panel truck. It is powered by a three-cylinder Perkins 34 hp Diesel, and although the body is of more conventional design, improved forward visibility is obtained by mounting the short engine deep in the chassis which permits a lower hood. This engine position allows for the one-piece drive shaft from the four-speed gearbox to pass beneath the frame cross-members to the hypoid rear axle.

The 4 x 4 Land-Rover is now being produced with a



**New horizontal six-cylinder Diesel designed for underfloor mounting in the A.E.C. lightweight Monocoach.**

pick-up body and longer wheelbase extending to 107 in. Load capacity is increased by 25 per cent, and a detachable hood is available.

Forward control has been introduced by Austin in three new truck chassis: a two-ton and a five-ton with short and long wheelbase. Specifications are similar to transport vehicles in the existing Austin range, and all use the standard six-cylinder gasoline engine of 243.7 cu in. piston displacement. Five-ton models, however, are offered with a Perkins P6 Diesel as an alternative.

Atkinson's "Alpha" passenger chassis is equipped with an air-operated epicyclic gear box made by Self-Changing Gears, Ltd., of Coventry. This four-speed unit with fluid flywheel requires no foot pedal, and is controlled entirely by a five-position lever. Brake bands for the individual gear trains, and for the top-gear clutch are operated by cylinders in the conventional manner. Remote control gear-change is claimed to be particularly

(Turn to page 126, please)



**Bedford Dormobile which may be used as a small bus, station wagon, or light truck.**

# PONTIAC

*brings out*

## Star Chief Series

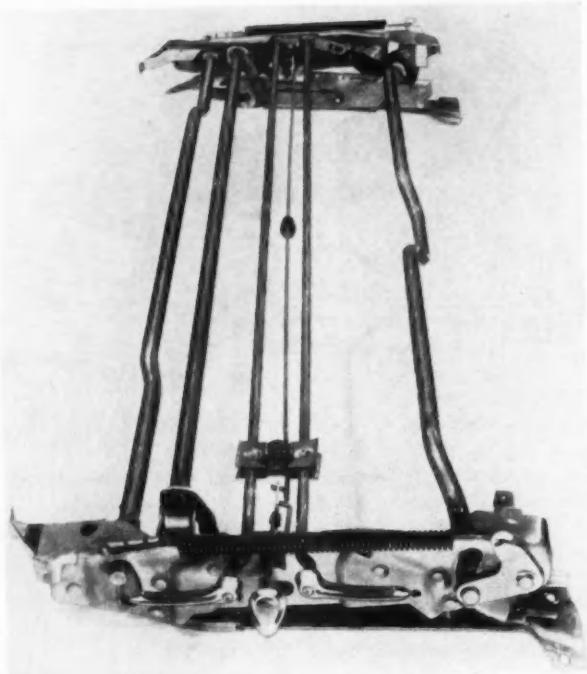
PONTIAC for 1954 introduces a new line of passenger cars and an improved and re-styled line of Chieftains which incorporate many engineering advances.

The new line, designated the Star Chief Series, has a wheelbase of 124 in. as compared with 122 in. for the rest of the 1954 models, and an overall length of 213.7 in., or 11 in. more than the rest of the line. It is available only with the straight eight engine coupled with the Dual-Range Hydra-Matic transmission and a new axle ratio of 3.23:1. Horsepower of the eight-cylinder engine with Hydra-Matic transmission has been increased from 122 to 127 at 3800 rpm with a 7.7:1 compression ratio.

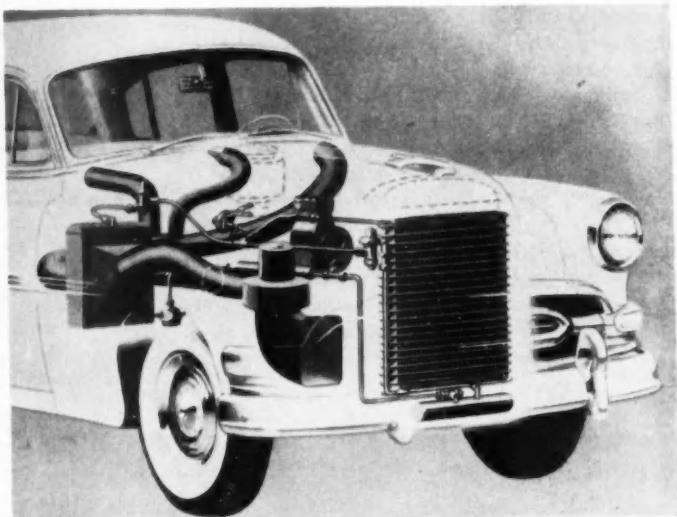
The Chieftain line is available on the 122-in. wheelbase (over-all length: 202.7 in.) with eight or six-cylinder engine and Hydra-Matic or synchromesh transmission. Horsepower for the eight-cylinder engine with Hydra-Matic and 3.08:1 axle ratio is 127. With synchromesh and a 3.9 standard axle ratio the eight-cylinder engine has a 6.8:1 compression ratio and develops 122 hp. The six-cylinder engine gives 118 hp with high-compression head and Hydra-Matic and 115 hp with 7.0:1 compression head, synchromesh and 4.1 standard axle ratio.

Four body types are offered in the Star Chief Series—Custom Catalina (two-door), Custom four-door sedan, DeLuxe four-door sedan and convertible.

The Chieftain line includes a Custom Catalina, DeLuxe Catalina, four-door sedan, two-door sedan and station wagon. The Chieftain Special Series includes a four-door sedan, two-door sedan, three-seat station wagon and two-seat station wagon.



Operating mechanism of the new front seat control which can provide 360 different seat positions.



The air conditioning system, offered as a factory-installed accessory with all eight cylinder engines, is entirely front mounted as shown.

Pontiac continues to offer a taxicab model, but has discontinued manufacture of a sedan delivery.

The Hydra-Matic eight-cylinder 7.6:1 compression ratio engine has a new carburetor and intake manifold. Sectional area of the bore below each throttle valve in the carburetor is 20 per cent greater than formerly and the size of the mating orifices in the intake manifold have been enlarged to conform.



**Star Chief Custom Catalina.**

A new spark plug wire support and ignition coil bracket has been added to the eight-cylinder engine to reduce the loss of electrical energy caused by grounding against adjacent metal. Each spark plug wire now is separated and lifted further above the cylinder head than in previous designs.

An improved current and voltage regulator is used on both the six and eight-cylinder engines. In the new design, the speed booster, or series winding, has been eliminated, thereby improving voltage control characteristics.

The six-cylinder engine has a new distributor with which improved performance has been accomplished by revision of the distributor cam and breaker arm assembly to increase the cam contact angle. This provides higher voltages and greater voltage reserve. An all-weather cap of greater diameter and greater height provides better protection against moisture and dirt.

An aluminum dipping (Aldip) process has been adopted for the valves of the six-cylinder engine. By this process the head end of the valve is dipped in a molten aluminum bath under accurately controlled time and temperature conditions. A thin layer of aluminum adheres to the dipped surface and also combines with the steel. This is said to make the valve material more resistant to high temperatures as well as to operational stresses and to reduce failure due to pitting and burning.

Wheelbase for the Star Chief series has been lengthened from 122 in. to 124 in. and the frame lengthened proportionately. Rear spring suspension has been increased from 58 in. to 60 in. and another leaf added to the rear springs.

Body mounts are doubly insulated with a softer rubber than previously used and have been re-located for maximum reduction of vibration and noise.

Exterior changes on 1954 Pontiacs include the radiator grille, radiator nameplate, hood ornament, parking lamps, DeLuxe and Custom side moldings, Special model fender nameplates, chrome gravel guards for Special models, trunk compartment handle and

molding, rear fender identification markings and wheel disk color treatment.

A new seat adjustment mechanism, exclusive with Pontiac, is offered as a factory-installed accessory for 1954. Capable of 360 different front seat positions, the new seat is mechanically operated and does not use hydraulic or electric power. It may be tilted forward or backward, raised or lowered, or moved back and forth. Control is by two levers at the left hand side of the seat, positioned just ahead of and just behind the regular seat control knob.

An air conditioning system is offered as a factory-installed accessory with all eight-cylinder engines. All major components of the system are located forward of the dash, with the cooled air entering the car through two adjustable nozzles mounted in ball sockets at each end of the instrument panel and through a valve outlet in the air conditioning control board on the instrument panel. The Pontiac unit includes refrigerant, compressor, condenser, liquid receiver, expansion valve evaporator and back pressure valve. The refrigerant used is Freon 12, a non-toxic, nonflammable, practically odorless gas with a low boiling point.

Vacuum power brakes are offered as an accessory on 1954 models.

Another new factory-installed accessory for 1954 is power-driven, push button-controlled, front door window lifts. Two toggle switches for operating each front window are located on the driver's door, a single switch on the right door for the right front window. Power for the movement of each window comes from a d-c, reversible electric motor mounted inside each front door.

Rounding out the accessory line for the 1954 Pontiacs are a number of other items including an instrument panel safety cushion of resilient fiberglass covered with color-keyed Morrokide, improved power steering, Arctic windshield wiper blades, door edge guards, door handle guards and a wide brake pedal pad for cars equipped with Hydra-Matic and conventional brakes.



View in PowerFlite transmission assembly department showing portion of the unique Jervis B. Webb "power-and-free" conveyor system. The independently mounted switch — at left end of each carrier — is positioned manually to specify the course to be followed by each individual carrier on its journey through the assembly department, testing, and shipment.

## Materials Handling Has Major Role in Production of PowerFlite Transmissions

By Joseph Geschelin

POWERFLITE automatic transmissions for Chrysler, De Soto, and Dodge Div. cars are flowing in a steady stream from the new Chrysler Corp. plant on the outskirts of Indianapolis. Placed in operation only recently and reaching mass production volume at the time this article was written, it is the latest of the automatic transmission facilities in the industry, and embodies examples of the most advanced methods and equipment available in this field.

It is only natural to find that materials handling equipment plays a major role in the organization of manufacturing facilities. Seventeen overhead conveyor systems for transporting raw materials, for feeding production lines, traversing sub-assembly lines and final assembly and testing have a total length of 15,963

ft—representing over three miles of overhead conveyors alone. Included in this total is an extensive system of J. B. Webb power-and-free conveyors arranged for delivery of transmission assemblies from the assembly line to testing and shipping. It embodies some unique features which will be described later.

Gravity roller conveyors—composed of standard Logan sections—installed in machine shop areas, heat treat, and elsewhere, run to over 10,000 ft. The burden of manual handling is further lightened or eliminated by the introduction of 76 craneways having a total length of some 11,556 ft. These craneways are equipped with 112 electric hoists of various sizes, ranging in capacity from 50 lb to five tons.

Just on quick appraisal one is impressed with the particularly large batteries of big machines that dominate the scene. A veritable forest of towering Bullards is very much in evidence—Mult-Au-Matics, Contin-U-Matics, and Model K machines; a group of 12 of the gigantic Fellows 10-station gear shapers; 15 Michigan Shear-Speed machines; the massive array of screw machines in a single department; and the row of 16

This view in the PowerFlite assembly department gives some impression of the configuration of overhead conveyors, gravity roller conveyors, and other materials handling devices typical of the general perspective in this plant.



Merz testing machines for final inspection of transmissions. The plant is replete with many other items of equipment of familiar make and type too numerous to list in this quick high-lighting study.

Built on spacious land area, running some 114 acres, the plant has a total of 800,000 sq ft under roof, 650,000 sq ft of this being manufacturing area. At the present time it boasts some 2900 pieces of equipment, including about 1600 machine tools of various types and makes. Good seeing, so essential to a precision operation of this character, is assured by the installation of 8000 fluorescent lights, each one containing two five-foot tubes.

The PowerFlite transmission is composed of about 508 parts. Of these, the Indianapolis plant machines 120 parts, and buys approximately 156 finished parts from the outside. Potential capacity of the plant is about 2400 transmissions per day on a two-shift basis.

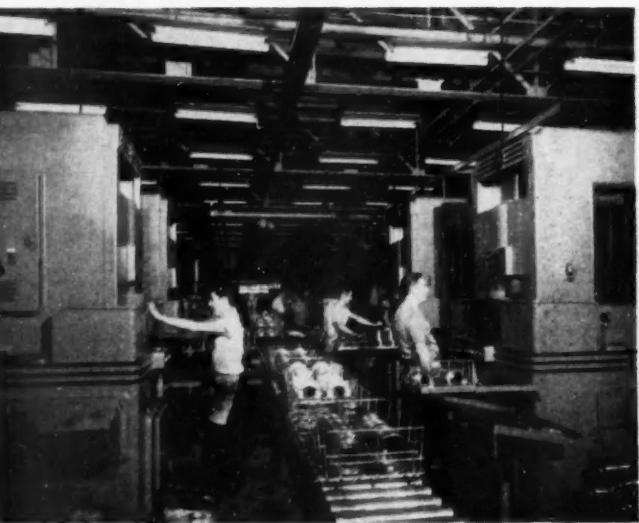
Some impression of the scope of the manufacturing problem may be gained from the variety of materials that have to be machined here. It includes: gray iron castings; pearlitic malleable castings; 14 different aluminum die castings, including the rear extension which is the largest die cast part; and a variety of steel parts—including Amola gears; and shafts of 8620 and related specifications; and the gamut of valves made of 1117 steel. In addition, the transmission contains Oilite thrust washers and nylon speedometer gears.

Because of this variety of materials with its allied problem of segregating scrap, each of these materials is handled in self-contained departments. In turn, each of the departments has been provided with its own chip conveyor system under the floor. Chip conveyors are located under each line

**T**HIS is the First in a Series of Articles on Operations and Equipment in Chrysler Corporation's New Automatic Transmission Plant. Part II, Covering Transmission Case Machining, the Final Assembly Department, the Screw Machine Department, and Miscellaneous Operations Will Appear in an Early Issue of AUTOMOTIVE INDUSTRIES.



Part of the battery of huge Fellows 10-spindle gear shapers installed at Indianapolis. This view in the gear and shaft department shows five of the impressive machines.



The big high production Michigan Tool Shear Speed machines seen here are part of a large battery of such equipment installed in a number of departments.

of machines, terminating at the end of the department and feeding a common conveyor which transports the scrap to the point of disposal outside.

While this is the general scheme underlying the plant layout, actually the floor plan has been divided into many specialized departments. Among these are the following: transmission case; automatic screw machines; pearlitic malleable; heat treat; miscellaneous parts; gear and shaft; finish grinding; gear cutting; band fabrication and assembly; sub-assembly machining; aluminum parts; and the air-conditioned area housing transmission final assembly; sub-assembly station, and final testing.

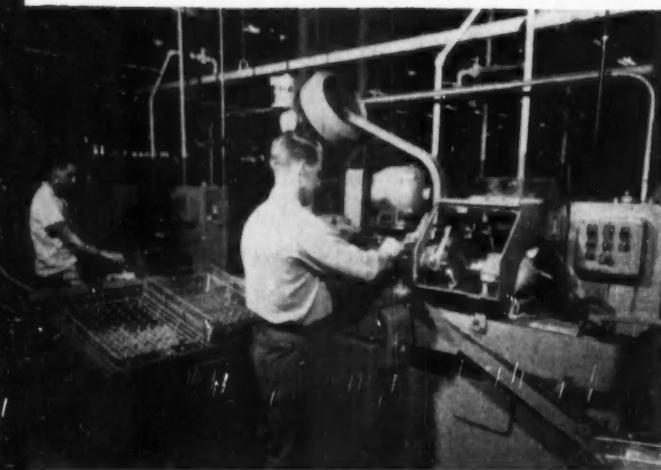
Since precision gear making is one of the major considerations, let us touch briefly on some of the aspects of the program. One dramatic feature is that the gigantic 10-station Fellows gear shapers are employed for cutting planetary pinions, internal gears, and the involute spline end of one of the shafts.

Although this equipment has been installed in a number of plants, the Indianapolis operation contains a massive battery of 12 of these machines, beyond a doubt the largest single installation of its kind to be found anywhere.

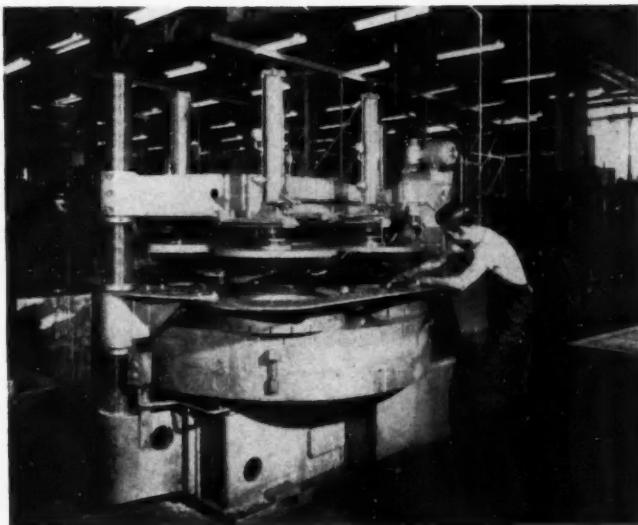
To effect control of final gear quality after heat treatment, all gears, whether internal or external, are shaved in the green in an enormous battery of Fellows gear shavers of various types. Planetary pinions, required in large quantity, are shaved on special Fellows machines, fitted with a magazine feed which serves not only to feed gears automatically to the work head but is also a sizing device designed to reject oversize gears. A similar magazine feed with a special form of sizing device is employed for shaving larger gears.

Statistical quality control techniques have been developed for controlling gear quality to assure smooth running, silent transmission assemblies. Heart of the system is an impressive gear laboratory, provided with inspection equipment of latest type. Planetary system gears are given a 100 per cent inspection on unusually high speed Michigan Tool gear speeders to check for proper mating as well as noise. The smaller planetary pinions, also subjected to 100 per cent inspection, are hand rolled for size and speeded for sound in special fixtures.

Modern gear quality, however, starts with verification of raw material specifications and extends through the entire production system to assure freedom from rejects at final inspection. In mass production, control must start at the source if high



Planet pinion gears have the internal bore finish-ground in these small Bryant internal grinders. Parts are fed to work station by means of magazine and feed chute mounted directly overhead on each machine.



The 72-in. Crane Lapmaster, installed in the miscellaneous machining department, is used for lapping various aluminum valve body parts.

standards of quality are to be maintained. At Indianapolis, every step in the process, including the set-up of a machine as well as tools and cutters, is inspected initially. And each machine operator is made responsible for controlling quality by checking work in process with suitable inspection gages.

Floor inspection, too, is employed as a further guarantee of quality. The role of the gear laboratory predominates in this program. Sample gears from each of the shaving machines are taken every hour for checking in the gear laboratory. These are inspected 100 per cent with Fellows checking machines for involute and lead, the machines being fitted with

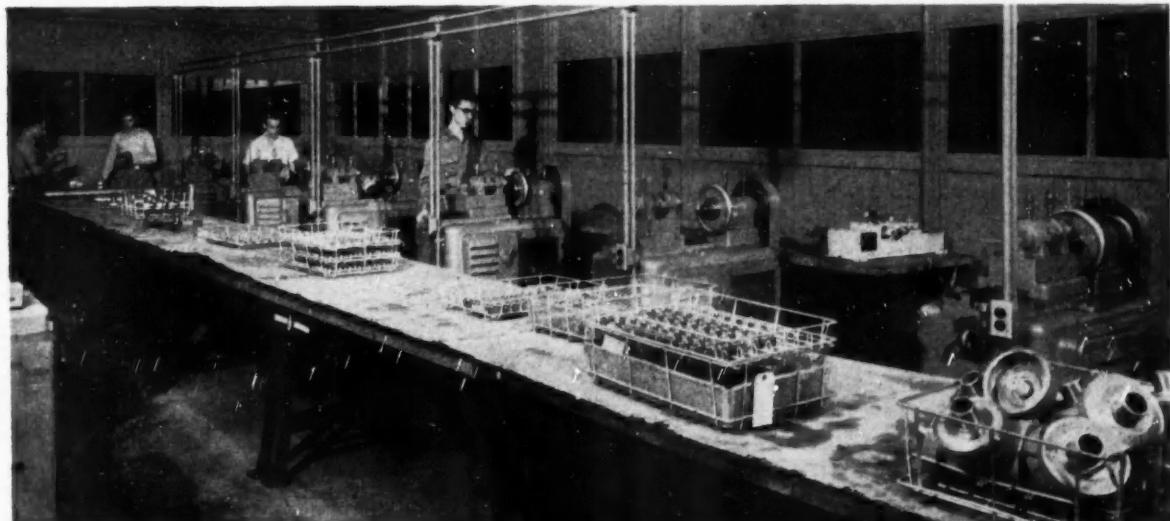
Red Liner chart recorders. The resulting records are kept on file as a means of policing the setup and performance of each shaver. In addition, green gears are tested in Michigan Tool speeders for noise and sound pattern.

Nor is this the whole story. Regardless of all precautions that can be taken to guard gear quality, some variations still exist in heat treatment. Consequently, it has become a daily ritual to select samples of each gear and run them through the regular heat treating procedure along with the production batches. These gears then go back to the gear laboratory where they are meticulously inspected for changes in major characteristics such as size, eccentricity, involute, and lead. In this manner a greater measure of control can be exercised over heat treat operations.

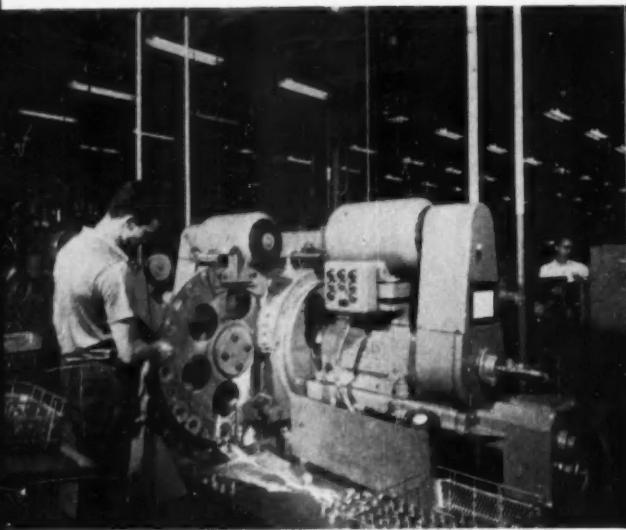
A number of the larger gears—where mass and variations in web thickness predominate—require die quenching in the familiar Gleason die quenching machines.

This operation too requires extremely close control and samples are checked regularly in the gear laboratory.

One of the distinguishing characteristics of the plant is the massive installation of enormous items of equipment such as the Fellows 10-spindle gear shapers mentioned earlier. In this category is a battery of 15 Michigan Tool Shear-Speed machines. Although this equipment has been widely used for special high speed gear cutting in various plants, Indianapolis employs Shear-Speed for cutting a variety of slots or serrations, primarily on the larger pearlitic malleable planetary elements—direct clutch piston re-



Scene in gear inspection department where all gears are given final testing before routing to assembly. In the background is one of the rows of Michigan Tool gear speeders used in the inspection procedure.



The sides of planet pinion gears are ground to size in this setup in a double-end Gardner surface grinder.



One of the many Fellows gear shavers installed at Indianapolis. This one handles the shaving of internal gears.

tainer, planet pinion carrier housing, and planet pinion carriers. Cutting of these wide, deep slots or serrations about the periphery of these parts has become a simple, high speed, routine operation.

Planetary pinions, mentioned earlier, are prepared in the blank form in the automatic screw machine department, ground on the OD in a battery of Cincinnati centerless grinders, then have the sides ground to proper width in Gardner double-end grinders. Before heat treating, the bore is ground in a battery of six of the familiar small Bryant internal gear grinders, each one being fitted with automatic magazine feed. The operator checks the finished bore with a Sheffield Precisionaire gage. Gear teeth are cut in Fellows gear shapers and shaved, then the gears are routed to heat treat. Among the final operations are: lapping the faces in Micromatic lappers; and honing the bores in Micromatic Microsize equipment.

While on the subject of gearing, it is of interest that Indianapolis has arranged a centralized grinding department for handling the gamut of parts in one place, on specialized equipment. One of the noteworthy features of this department is the centralized

coolant system. In operation, all of the coolant used in the various machines is connected to a large Hoffmann filtration system where the fluid is continuously filtered and recirculated.

The reaction shaft is one of the most interesting of the shafts produced for this transmission. It is comparatively short and massive, flanged at one end and involute splined at the other. Most of the major machining steps on this part are performed in a fast automatic cycle in the Bullard Man-Au-Trol machine arranged for handling three reaction shafts at a time. Drilling and tapping of the holes in the flange end are done in a multiple head Kingsbury.

The plant also exhibits a large number of Colonial broaching machines of vertical type, for surface broaching and hole broaching. One interesting example of surface broaching is found in the case of the drive coupling. This is a cylindrical part with two large tangs on each end, the tangs being produced in a large Colonial surface broaching machine of twin ram type. Each stroke of the ram removes a very considerable amount of metal at the end of the cylinder, leaving the two large tangs or dogs.

### Stamp for Trucks Marks Half Century Of Service

Recognition of 50 years of increasing service to the nation and its economy is to be accorded the trucking industry when the Post Office Dept. places its newest commemorative stamp on sale in Los Angeles on Oct. 27.

This year is accepted as the golden anniversary of the truck, although the "motor wagon" had been successfully operated much earlier. But it was in New York in 1903 that a contest was staked between a horse-drawn dray and an awkward, lumbering contraption powered by a motor.

The trucking industry has grown to where the number of vehicles in operation—including those operated by the

military services—total around nine million units. It employs upwards of six million workers directly.

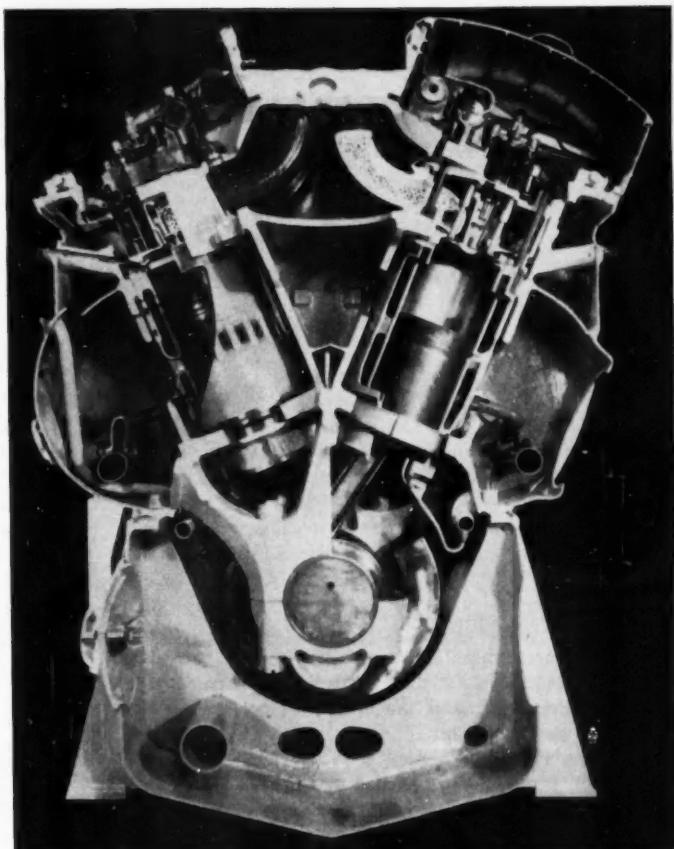
Automobile Manufacturers Association records indicate that in 1904 some 700 vehicles which could be classed roughly as trucks or motor buses were turned out. Production held to this level for another two years but in 1907 rose to about 1000, and factory sales in 1908 for everything not classi-

# Output of GM Diesel Increased by 250 Hp

RECENTLY the Electro-Motive Division, General Motors Corp., announced that its 567 Series, 16-cylinder two-stroke cycle Diesel engine will be rated at 1750 hp for its new line of 1954 Diesel locomotives. Since this has been accomplished without major changes in displacement or basic design, it is of interest to note how the new rating has been achieved.

It appears that although the 567B engine, used up to now, was rated at 1500-hp, the rating was conservative. Actually, the basic engine design was capable of considerably greater output. In fact, it is claimed that the 567B engine regularly delivered 1600-hp and theoretically was capable of delivering more than 2000 hp.

The basic changes in the 567C engine are as follows. In the first place, since the engine inherently was capable of greater potential output, it has been fitted with higher output fuel injectors, having a longer effective stroke so as to feed a greater amount of fuel to each cylinder. At the same time blower speeds have been increased to supply the greater amount of air required for proper combustion.



Cutaway section of the new 567C General Motors Diesel engine.

In developing more power, there is an increase in heat rejection. To handle this the design of the cylinder head has been changed to provide increased cooling capacity.

In addition, both oil and water cooling capacity have been increased. Because of higher temperatures the valves now are Stellite-faced to increase their durability.

Finally, the crankcase structure has been strengthened and made more rigid. The effect of this has been to reduce the stress level in the 567C engine below that of the previous model.

fied as a passenger vehicle amounted to 1500.

On the other hand, factory sales of passenger vehicles doubled in 1904, amounting to 22,000, and by 1908 rose above the 63,000 level as against the 1500 truck figure. No such remarkable strides were made ever—by the truck.

Truck production did not get above the 100,000 mark until the United States entered the first World War in

1917. Including those for direct and indirect military use, factories shipped some 128,000 that year. Advent of better roads following the end of the war brought about a steady rise in truck demand. It was not until the mobilization year of 1941 that factory sales topped the million mark. Since 1947, it has stayed above that figure.

Percentagewise, truck production in the first big year of 1908 accounted for

about two per cent of total automotive unit output. By 1952, truck and bus production made up 22 per cent of unit output. Wholesale value of truck and bus production has been running roughly around \$2.3 billion; exports—including chassis, engines and parts for assembly abroad—ran close to \$350 million last year. Figures do not include accessories or replacement parts.

# COLORFUL CARS

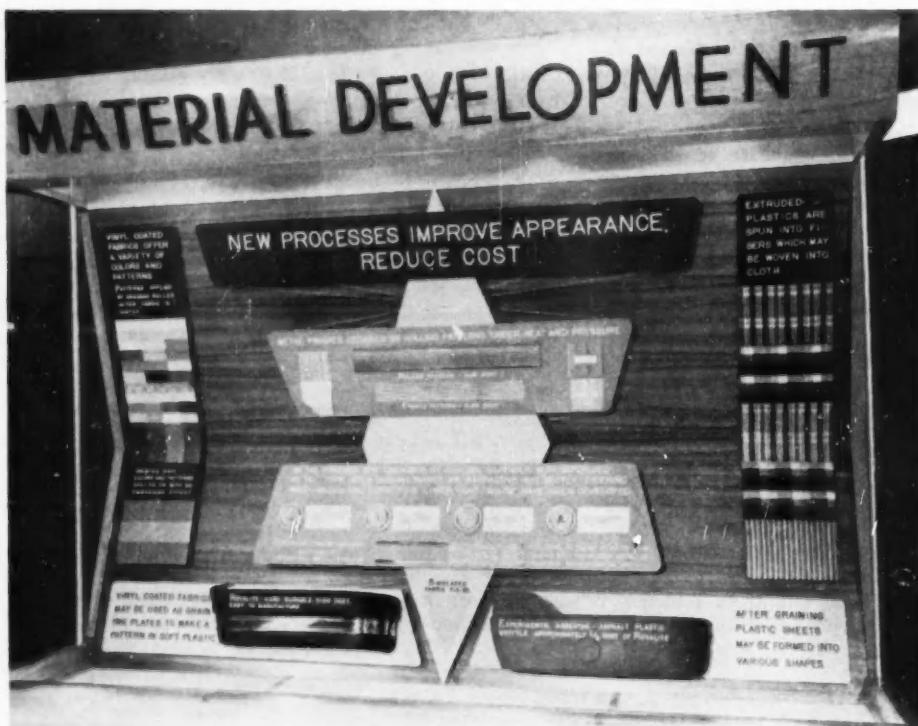
**A**DVANCES in the science of color and paint will make the coming model year the most colorful in automobile history, a press gathering in Detroit was told recently in viewing a remarkable demonstration in the color and styling laboratories of Chrysler Corp. The entire vista of the fundamentals of color—physical, physiological, chemical, and psychological—was unfolded in a series of dramatic panel presentations. Other displays highlighted the principle of color relationships in automotive styling; selection and development of fabrics; studies of future fabrics; paint development; and the effects of color cycles on consumer preferences.

Color harmony, according to V. M. Exner, director of styling, introduces a third dimension in automobile design, becoming as important a sales factor as body styling and engineering. In 1954 models Chrysler

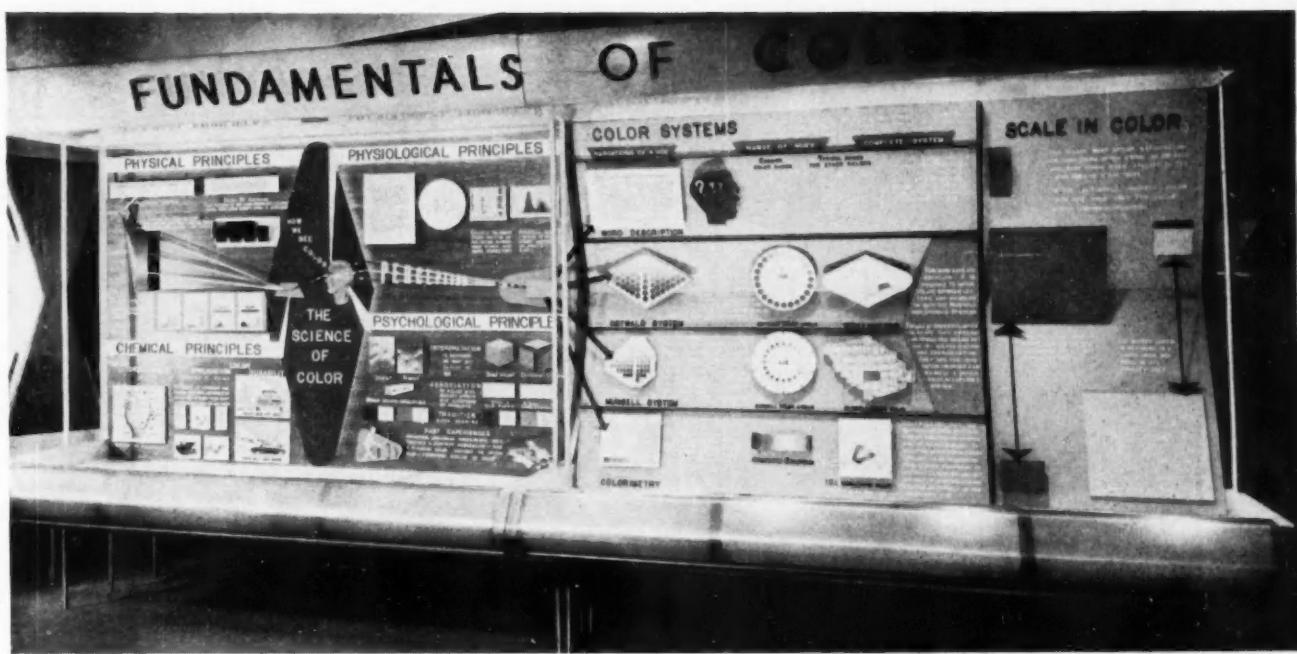
Corp. is offering 58 colors and 86 two-tone combinations. He predicted that Plymouth will establish a new era in styling with the introduction of a series of cars whose interiors right down to floor mats will be keyed harmoniously to their two-tone exteriors.

Now that durable exterior paints have become available in great variety, the science of color is being explored to enhance the appearance of the automobile. For example, Chrysler will offer 15 shades of blue in Plymouth, Dodge, DeSoto, Chrysler and Imperial cars because of the current popularity of blue. Green is the second color most pleasing to the eye. At present light blue is the first choice while green is second. In addition, the fact that gray is a neutral color gives it wide acceptance. Eight shades of gray will be used in 1954 by Chrysler Corp. It is also found that red, a basic color, is now regaining popularity since the developments of titanium and cadmium have given red greater durability.

In similar fashion, Chrysler Corp. has taken long strides in the development and selection of fabrics, culminating in a third-dimensional effect with the adoption of jacquard textured fabrics. Depth in this fabric is obtained by a new weaving technique that



**The story of how new processes and techniques are harnessed to improve appearance at lower cost is told dramatically in the series of examples shown here.**



This large panel illustrates the fundamentals of color from the standpoint of scientific principles, color systems, and scale.

makes it possible to raise or lower each warp to produce intricate patterns in bas-relief.

The styling studios study magazines on women's fashions and interior decorating, examine furniture, dresses, draperies, carpets, raincoats, and even golf bags with an eye towards using either the material or pattern for upholstery.

Economy has resulted from close investigation of materials and milling techniques. Nylon, acetate and viscose fibers are durable, sunfast, inexpensive, and offer a wide variety of colors and weave designs. Today many models are trimmed entirely in nylon and vinyl combinations.

Today close cooperation is essential between chemists, stylists, and production experts in the development of man-made materials. Among the fabrics of the future are visualized many varieties of extruded plastics—spun into fibers and woven into cloth; and stain-resistant cloth treated with silicone compound that even ink cannot stain.

Too, Chrysler styling specialists are devoting considerable attention to the development of new materials and techniques that hold promise of improved appearance and durability at lower cost. One example of this is the treatment of the "shelf" of the instru-

ment panel behind the windshield on 1954 Plymouth and Dodge cars. This is given a coat of textured enamel resembling Scotch grain leather. Besides giving the instrument panel a fresh and richer appearance, the coating absorbs most of the reflected light.

Another example is the gold steering wheel medallion on the new Plymouth. In the past, amber plastic backed with vaporized aluminum was used with fair success to simulate the effect of gold. Later the designers obtained a truer gold effect by spraying transparent gold lacquer on clear plastic backed with vaporized aluminum. Now the experts have come up with a secret gold colored alloy. When vaporized and sprayed on clear plastic, this alloy closely resembles the interesting 24-carat gold appearance that the stylists want.

Finally, Chrysler emphasizes that we have come a long way since the days of the brush and varnish bucket. Many years ago it took an average of 28 days to paint a car by hand methods. Today a car can be completely painted from the bare metal stage through the final coat in a matter of four hours. With normal service and reasonable care, modern two-coat enamel finishes remain in good condition for the useful lifetime of a car.

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#### **Denison Announces Plan for Hydraulic Awards**

A scholarship award plan to foster interest in the field of industrial

hydraulics has been announced by Denison Engineering Co.

It will be awarded annually to one or more graduates of Franklin County (Columbus, O.) high schools with the possibility of a second award

being available to a graduating student with a parent in the employ of the Denison company. Winners are to select a course of studies in hydraulics, or in engineering with special emphasis on hydraulics.



Hudson's Italia sports car was styled by Touring of Italy. The body is made of aluminum built on a Super Jet chassis. Weighing under 2000 pounds, it has been clocked at over 100 mph, using the Hornet engine. The car has individual bucket seats belts and two-piece backs. Note that top is cut away at door.

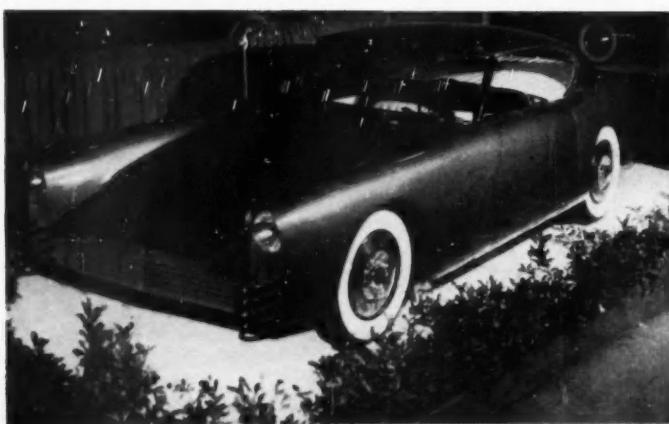
## Sport Cars featured at West Coast MOTORAMA

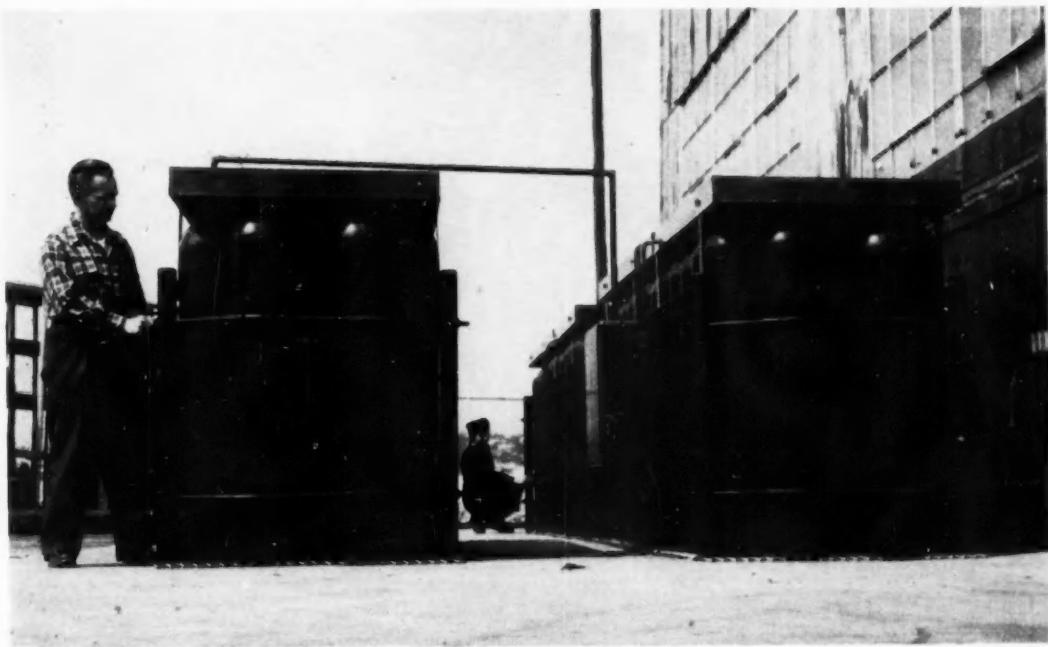
MORE than \$2 million worth of automobiles—hot rods, custom built and European cars—were on display at the Fourth Annual International Motorama held in Los Angeles recently. This year's attendance exceeded last year's 125,000. Devotees of sports and custom built cars had a field day. They saw some of the finest equipment in the country. A dozen different models featured glass-reinforced plastic bodies.



Glasspar fiberglass body fits neatly onto specially designed chassis. The 100-in. wheelbase frame is adaptable for almost any kind of engine and running gear desired.

Ferrari type aluminum coupe on a 102-in. wheelbase features Ford chassis and Cadillac engine. Radiator is in rear with engine in front.





Cascade storage system which supplies 85 inert gas welding stations inside the plant through 3800 ft of extra heavy steel piping.

## Cascade System for Storage and Distribution of Argon

A NEW argon gas storage and distribution system at Ryan Aeronautical Co., San Diego, Calif., will reduce gas costs, eliminate lost welding time and avoid all gas bottle handling. The system is a 52,000 cu ft storage facility composed of 186 steel cylinders manifolded together in three banks. From these, there is a network of 3800 ft of extra heavy steel piping to feed the argon gas to every inert gas-shielded arc welding booth in all factory buildings.

Before the new installation was made, the 85 inert gas welding stations had to be served with individual argon gas cylinders. This presented a number of disadvantages compared with the new central storage system. For instance, each welding booth was subject to gas depletion every time the gas pressure in a cylinder dropped to 25 psi. This required a replacement service in which a full cylinder was brought to the station and installed. On each occasion, the depleted bottle had to be disconnected, the gage removed and attached to the full bottle, the line blown to remove dust and the new bottle attached. During this procedure, welding was interrupted and production time lost.

Another item of cost incurred was the value of

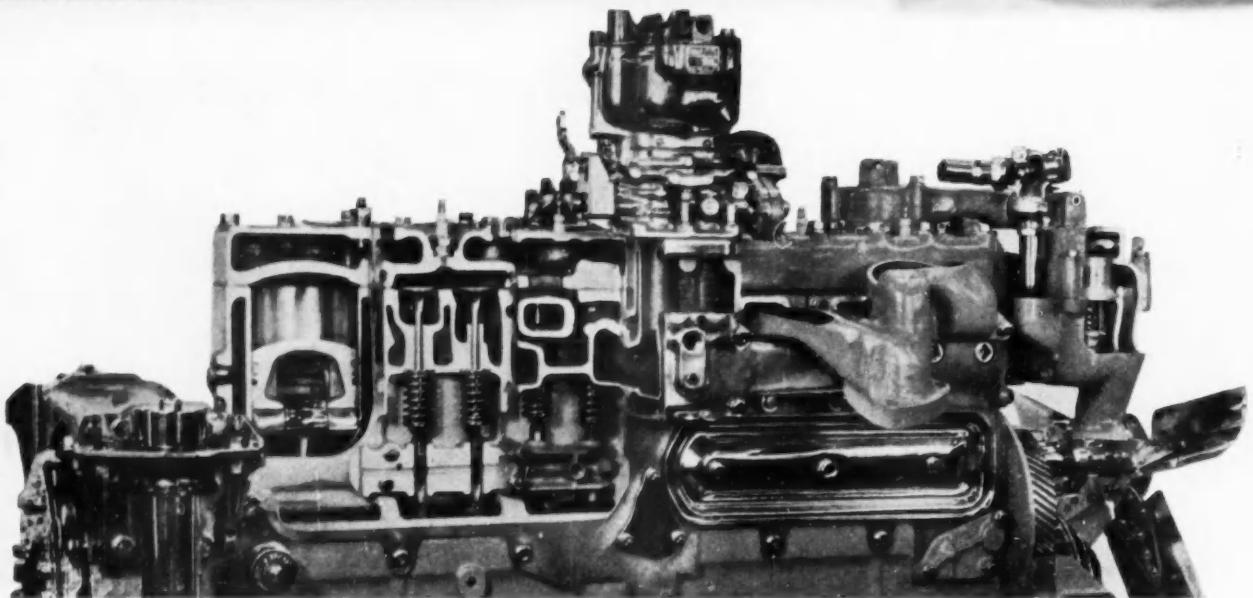
residual argon left in each cylinder. Bottles could not be totally emptied but had to be replaced while they still contained 25 psi of gas. This practice, used to prevent contamination of the bottles by air, resulted in loss to welding use of quantities of gas.

In order to provide a ready supply of argon cylinders, which Ryan used throughout three large buildings at the rate of 572 bottles a month, groups of them had to be stored in designated locations within the plant.

Undoubtedly, the major financial benefits which will accrue from the adoption of the new facility will be the savings which bulk purchases will provide. Instead of buying the gas in 275 cu ft bottles, the entire system can be charged in a single operation.

By reading the pressure and temperature gages on the banks and consulting a chart, it is a simple matter to determine the exact volume of gas in the system. When a bank drops to a predetermined volume the supplier is called and a tank truck delivers the gas and pumps it into the low bank. While one bank is being replenished, another is used to feed the plant. The

(Turn to page 88, please)



Cutaway view of the right side of the Model 370A Mustang engine. Note the domed pistons and cylinder heads.

## New White Engine Is Designed for Compression Ratios to 10:1

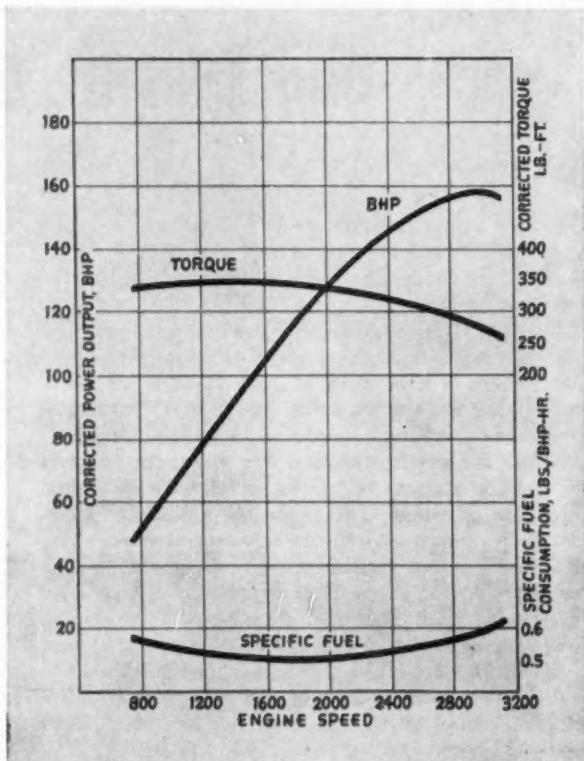
**F**EATURING many innovations in design for truck engines, the White Motor Company's latest Mustang gasoline engine has been engineered for compression ratios up to 10 to 1. The six-cylinder, 451 cu in. engine—4 $\frac{3}{4}$  in. bore and 4 $\frac{1}{4}$  in. stroke—has a gross horsepower of 177 at 2800 rpm with a 6.75 to 1 compression ratio. With this Model 370A engine, a relatively flat torque curve is obtained through a speed range of 800 to 2000 rpm. It is used on the new 3024 series COE models.

One of the most important features of the engine is the domed type combustion chamber and piston which are said to permit optimum air flow even at high compression ratios. Together with this combination, the piston utilizes a NI-Resist, Al-Fin bonded insert in the top ring groove. A chrome-faced compression ring is used in the insert. Results of tests run at White indicate greater piston ring life with the new top ring design.

To provide even cylinder head compression and to minimize head cracking, the cylinder head has been designed with large radii ribs over the combustion chambers.

The exhaust valves are of the hard-faced, sodium-mercury filled type. Intake valves are of the hard-faced flat type with increased

(Turn to page 88, please)



Net performance of the 6.75 to 1 compression ratio Mustang with air cleaner, generator, air compressor, fan and muffler.



# AIR CYLINDERS

## HARD CHROME PLATED PISTON RODS

Prevent Scratch-Damage,  
Nicks and Rust

## DIRT WIPER SEALS

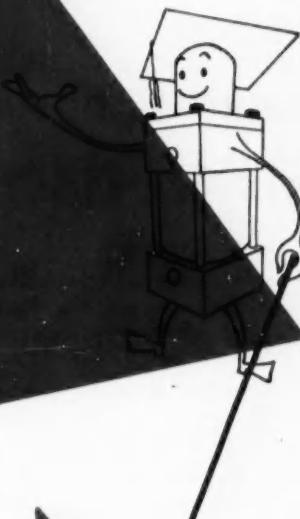
Protect Rods, Seals, Bushings

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Eliminate Breakage

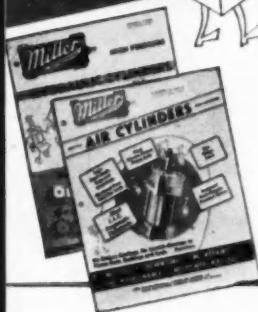
## BRASS BARRELS

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Complete Miller cylinder line includes: air cylinders, 1½" to 20" bores, 200 PSI operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 PSI operation, 8" to 14" bores for 250 PSI; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 PSI operation. All mounting styles available.



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MET J. I. C. PNEUMATIC STANDARDS years before their adoption in 1950.

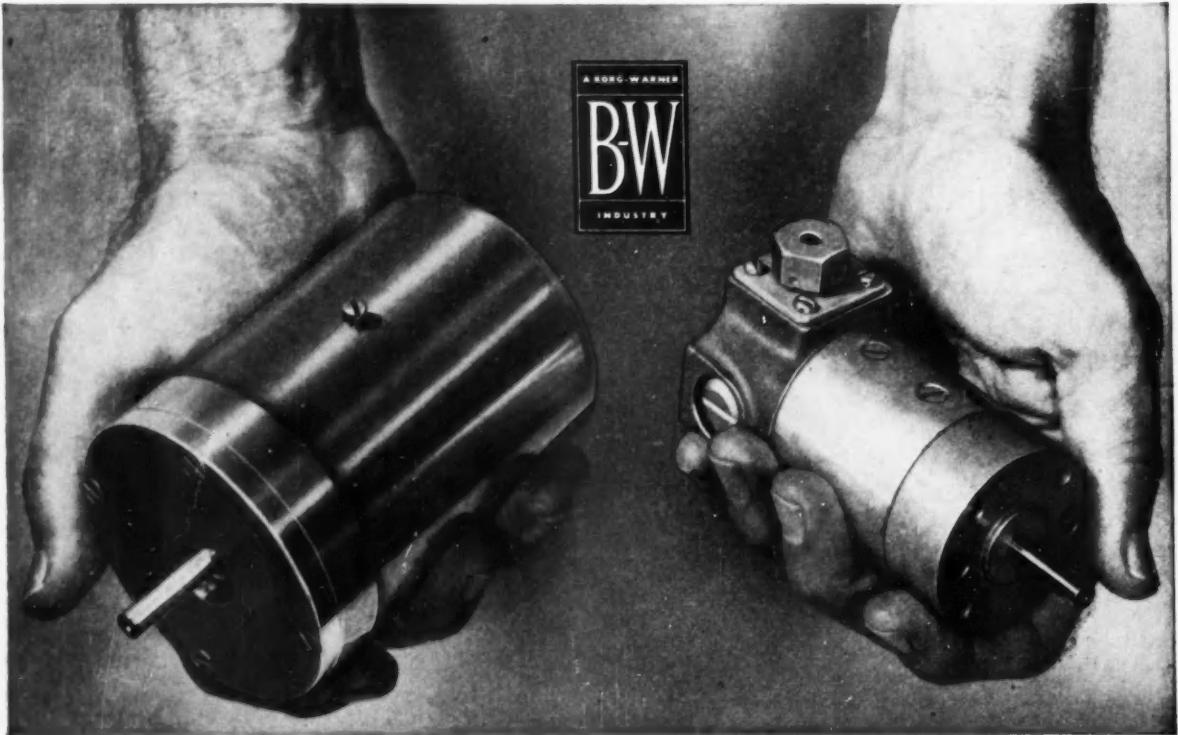
SPACE-SAVING SQUARE DESIGN originated by Miller in 1945.



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COUNTERBALANCE CYLINDERS

MILLER MOTOR COMPANY



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By using standardized parts in a series of six co-ordinated frame sizes, Pesco can provide you with electric motors for electronic applications with voltages from 6 to 120 volts D. C.; from 1/100 to 6

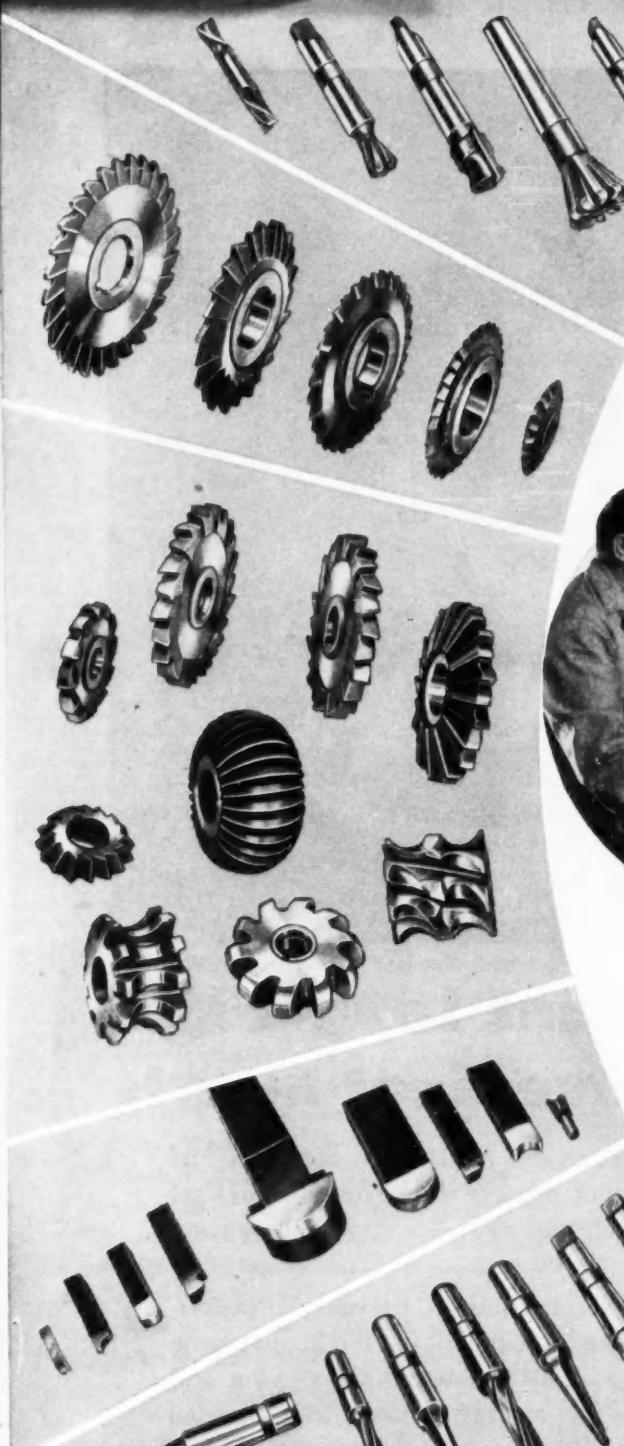
H. P. for operating speeds up to 15,000 R. P. M. Special, high-altitude design will operate from -65° to + 165° F.

Pesco high-frequency A.C. induction motors, squirrel-cage type, are built in a series of 5 co-ordinated frame sizes to meet horsepower requirements of .01 to 9.0, at 400 cycles per second.

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Radius  
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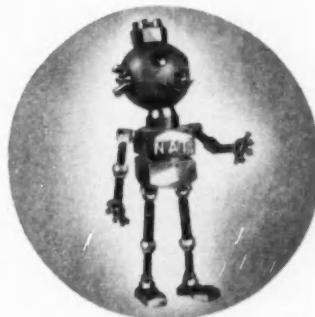
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FASTENERS



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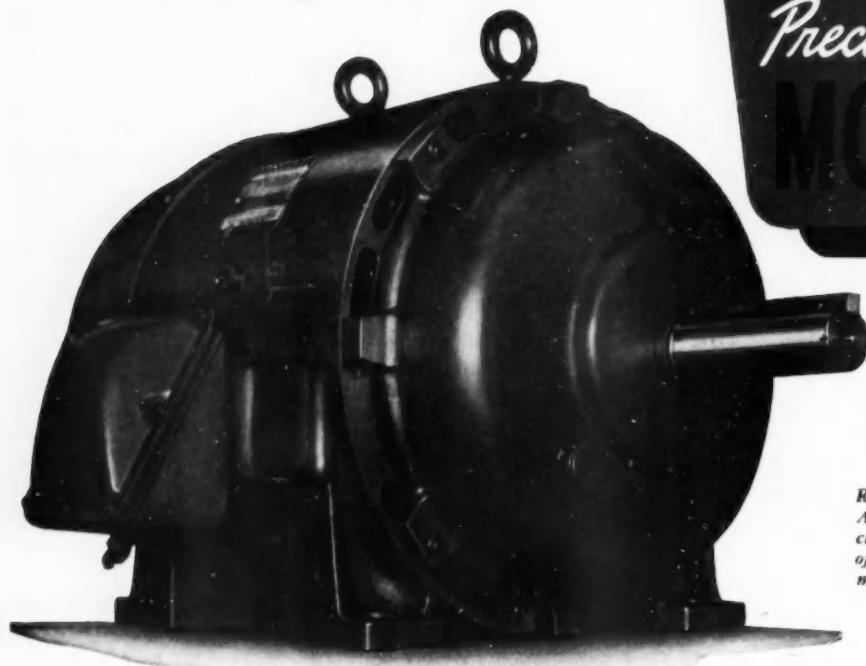


CHESTER HOISTS



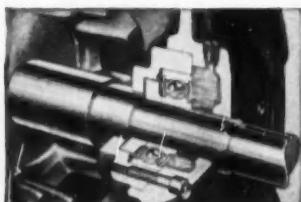
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# News of the MACHINERY INDUSTRIES

By Thomas Mac New

## 4000 HP Hydraulic Pumps

The Waterbury Tool Co., Div. Vickers Inc., has designed and built two huge hydraulic pumps for the E. W. Bliss Co. which is building a large tube reducing machine for Tube Reducing Corp. These pumps, of 4000 hp each, will be required to move the 150 ton saddle which carries the dies back and forth across the tube at a closely controlled rate and through a closely controlled distance in the tube reducing mill. Maximum length of the saddle reciprocation is 72 in., and the maximum rate of reciprocation is one cycle per second. Since no reversing valves are used, this requires that the pump reverse its delivery once each second. Basic design of the pumps is based on the Williams-Janney axial piston, angle plate principle.

According to Waterbury engineers, the pumps deliver 2300 gpm when operated at 400 rpm and maximum plate angle. At the maximum pressure of 3000 psi, the pumps will handle 4000 hp each. Because each pump in this application is required to stroke from zero to 2300 gpm in  $\frac{1}{2}$  sec, then back to zero in  $\frac{1}{2}$  sec and reverse through the same cycle, it is important to keep the reversing load to a minimum. For this reason, the angle plate in the pumps is mounted on a vertical axis to eliminate gravity effects on rapid stroking. A servo mechanism controls the pump angle plates during stroking, using a phase shaft between the saddle and the pumps to provide the control force.

Two double acting cylinders, each 13 in. in diameter with double seven-inch piston rods, are used to drive the saddle of the reducing machine. Each cylinder will be connected across one pump with equalizing lines to coordinate the cylinder movement.

Both pumps will be electrically driven through speed reducers having a ratio of approximately 4.83 to 1. The high speed shaft of each speed reducer carries flywheels which work with the saddle so that the stored energy of the system flows from the

flywheel to the saddle and back. Each pump will be driven with a 700 hp, 1800 rpm electric motor. The pumps will be required to accelerate the saddle from standstill to 600 fpm in  $\frac{1}{2}$  sec and three feet of travel during which the units act as pumps flowing energy from the electric motors and the flywheels to the saddle. During the next  $\frac{1}{2}$  sec and three feet of travel, the pumps will be required to decelerate the saddle from 600 fpm to zero.

## High Award to Former J&L President

The Honorable Ralph E. Flanders, U. S. Senator from Vermont, and former president of Jones & Lamson Machine Co., Springfield, Vt., received one of American industry's highest awards for standards work. It was presented at the recently held three-day National Standardization Conference, sponsored by the American Standards Association. The medal awarded to the Senator is given annually for "great service in advanc-

Huge Hydraulic Pumps Built for Tube Mill Can Deliver 2300 GPM at 3000 PSI. Michigan Tool Co. Negotiating for Purchase of Manistee Iron Works.

ing the national economy through voluntary standards," and is known as the Howard Coonley Medal. Roger E. Gay, president of the ASA, made the presentation.

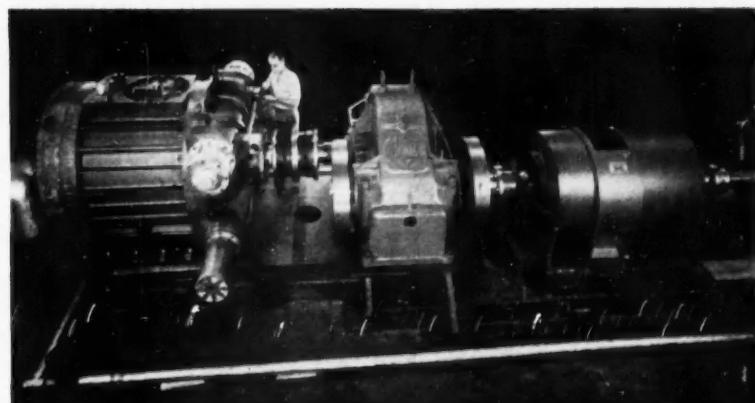
## Michigan Tool May Buy Manistee Iron Works

Michigan Tool Co. is negotiating for purchase of the physical assets of Manistee Iron Works, Manistee, Mich. Currently, Michigan Tool has been operating the Manistee plant under lease. Under the proposal, the machine tool builder would acquire the name, goodwill, and business of the iron works, including the right to manufacture and sell all present products of the company.

## Around the Industry

Austin Motors Export Corp. was one of the firms directly represented on the unofficial British trade mission to China this summer.

Commercial vehicle manufacturers indirectly represented were Scammon (Turn to page 150, please)



One of the 4000 hp hydraulic pumps built by Waterbury Tool Co. It will be used on a giant tube reducing machine.

# EQUIPMENT

PLANT • PRODUCTION

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 73

## Press Auto-Loader

A line of automatic loaders for stamping and forging presses are said to permit production increases of up to 300 per cent over conventional manual-loaded press equipment.

The main feature of the loader design is a 120-deg index table with an offset flanged drive motor and index mechanism that permits the mounting of the die punch at the optimum dead center ram position. Thus, maximum punch and die stability is provided and the loading of large die blocks is possible without punch interference.

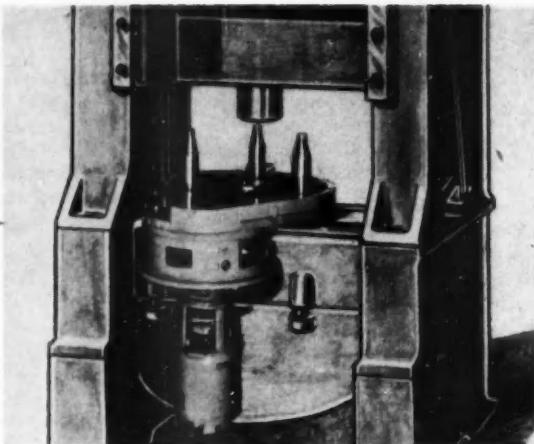
These automatic loaders have a high speed standard shock-free, constant accuracy, modified cycloidal cam and shot pin index mechanism. They are ideally adapted to the handling of second-operation stamping processes including piercing, forming and coining. Parts can also be processed through forging presses with the automatic loaders.

Production parts can be loaded and unloaded from the loaders either manually or by auxiliary feeding devices.

The loader illustrated rotates in a clockwise direction on a crank press that coins the bodies of steel and copper rifle grenades. After coining, a grenade body is removed from the right hand punch member, and an unfinished part manually loaded in its place. At the left hand punch position an auxiliary device forces the body over the punch. Each index is initiated by operating a pushbutton clutch control.

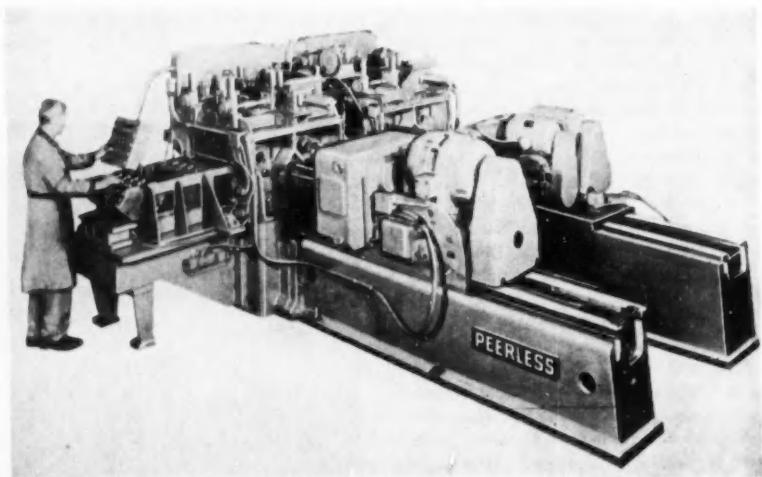
The press on which the loader is mounted is interlocked with the loader control assuring that the ram will not come down unless the index is locked in position. The index will not operate unless the ram is at the top of the stroke. The index mechanism in this application is an 0.7-sec type that permits a production rate of 1200 pieces per hour. *Hautau Engineering Co.*

Circle 66 on page 73 for more data



This model is driven by a 1/2-hp, 1200 rpm, 440-volt flanged motor, clutch and gear reducer unit. The index mechanism, which drives the 24-in. diam table through spur gears, is a standard Model 16-B Hautau-Turndex unit.

## V-8 Cylinder Blocks Drilled and Bored



One of the world's largest automobile companies has just started to use this horizontal transfer machine in the manufacture of V-8 cylinder blocks. This two-station hydraulic-feed specialized production equipment is used for core drilling and semi-finish boring camshaft bearings, as well as for drilling various other holes in both ends of cylinder blocks. It produces 75 blocks an hour at 100 per cent efficiency. It features unitized transfer sections and hydraulic feed units; fixed-center ball-bearing heads with oil circulating pump for lubrication; hardened and ground way-type units with automatic lubrication; and electrical and hydraulic installations to JIC standards. (Peerless Production Co.)

Circle 67 on page 73 for more data

## Drill Has Two Horizontal Spindles

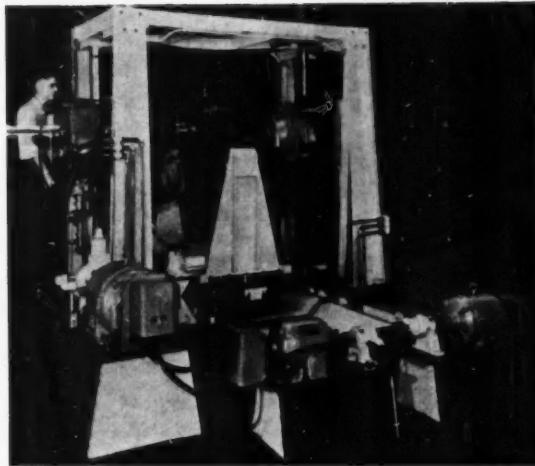
A unique type of semi-automatic, hydraulically controlled machine tool is designed to speed drilling operations on medium sized and large metal parts in both small lot and semi-mass production quantities. Named the opposed spindle drill, the machine combines the speed of a two-way drilling machine with the flexibility of a radial drill and the accuracy of a horizontal boring machine. Closely spaced holes that would prevent conventional multiple drill head and bushing plate drilling methods are produced on the machine.

Two fabricated steel vertical structures, each supporting two columns, are mounted on a welded steel base. The machine table is traversed on ground steel ways. Motorized power heads having integral hydraulic feeds can feed individual drills or drill heads at varying speeds into opposite sides of the work at different levels. The power heads are positioned vertically by twin hydraulic cylinders that are guided on the two ground round columns. The heads are designed to resist 23,000-lb unbalanced thrust loads.

The machine table is fed between the spindles by a single hydraulic cylinder. Horizontal table location as well as vertical location of each head is controlled by visible flush-pin type locators that work in conjunction with individual index plates. A single hydraulic power pack unit, which includes a motor, 1000-psi pump and a tank, provide hydraulic power for the machine. *Walter P. Hill, Inc.*

Circle 68 on page 73 for more data

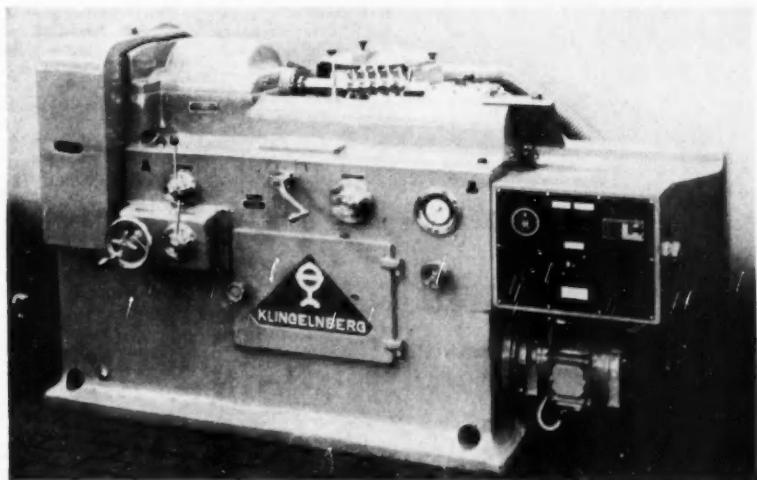
*This machine drills two  $\frac{3}{4}$ -in. holes at once in a 1200-hole condenser tube sheet. Power is supplied by a Hill No. 2 power pack having a five-hp motor and a 12-gpm pump. Two other Hill No. 1 power packs having three-hp motor and five-gpm pump furnish high pressure oil for hollow and gun drill type operations for each power head. The power heads are V-belt driven by 10-hp motors.*



## Hob Grinder Features Moving Wheel

A new method of sharpening gear cutting hobs, in which the hob table remains stationary while the grinding wheel reciprocates, is incorporated in the Klingelnberg tool and cutter grinder model GW 30. Hydraulically controlled and automatic in operation, the machine eliminates errors in positioning or indexing of the front rake, independently of the operator's skill or attention. Accuracy of indexing is within  $\pm 0.0001$  in.

*The Klingelnberg Model GW 30 grinder.*



Spiral lead is set by means of change gears. Setting is done by swiveling the grinding wheel to the correct angle, as indicated on a graduated scale. For any lead, the effective cone generating line of the wheel passes through the hob axis. No special dressing is needed to obtain this result.

In the sharpening operation, both the reciprocation of the wheel and the rotation of the hob are controlled by a single, hydraulically operated threaded spindle, a feature which assures conformity to the correct lead angle.

Indexing of the hob from flute to flute is controlled by hydraulic pressure. During each reciprocating cycle of the wheel, the pressure forces the notch-flanks of an index plate firmly against a pair of pawls, which are placed opposite to each other to avoid back-lash. At the end of one cycle, the pawls are automatically retracted momentarily. The hydraulic pressure then rotates the index plate one step to bring the next flute into position.

The GW 30 has a maximum wheel slide stroke of about 20 in. It will grind a maximum length of 16 in., with a maximum depth of cut  $3\frac{1}{2}$  in. Maximum diameter of work is 12 in. On spiral flutes, lead range is from 15 in. to 750 in. *Kurt Orban Co., Inc.*

Circle 69 on page 73 for more data

**NEW**

# EQUIPMENT



For additional information, please use postage-free reply card on page 73

## Large Hydraulic Cylindrical Grinders From Germany

A line of hydraulic cylindrical grinders built in Germany are available in five sizes from 16 in. to 32 in. swing and with center distances from 40 in. to 160 in.

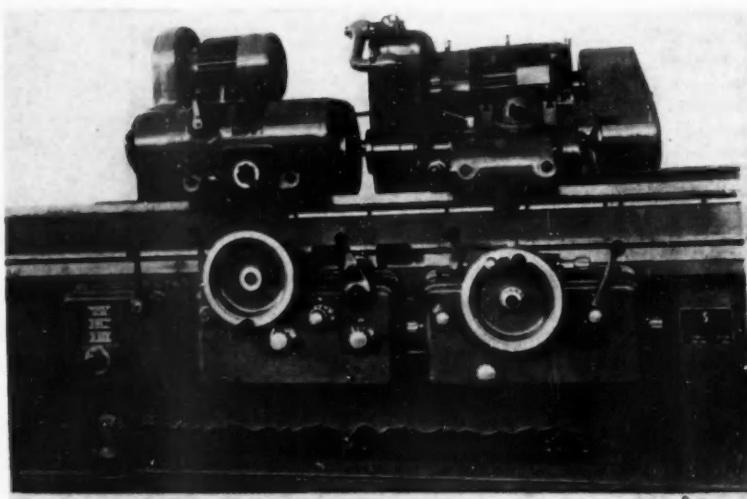
The box-shaped bed has bellow-protected bedways and is reinforced for maximum rigidity. The work table top is of triangular cross-section. It can be swiveled for grinding slender tapers, the amount of taper being set by graduated scale and vernier. The work carriage can be traversed either manually or hydraulically with infinitely variable table speeds up to 12 fpm. The hydraulic system is properly insulated to prevent pump vibration and oil temperature rise from affecting the operating accuracy of the machine. Table ways are pressure lubricated with filtered oil.

Carriage reversal is effected either by hand lever, or automatically by means of movable reversing dogs with micrometer adjustment. A dial equipped mechanism controls the amount of carriage dwell at one or both ends of carriage travel. The work head is arranged for both dead center and live center operation. The tailstock has a spring loaded barrel which can be locked in its retracted position.

The wheel head base moves on a V and a flat way. The nitrided spindle runs in adjustable bearings. Axial spindle thrust is absorbed by ball bearings. Grinding wheel feed is effected either manually or automatically. Automatic wheel feed of 0.0001 in. to 0.001 in. per carriage reversal can be obtained. To insure uniform feed in production setups, an adjustable stop with micrometer screw for compensating wheel wear is provided on the handwheel. A single control lever simultaneously controls work piece rotation, forward and backward movement of wheel head, start and stop of table reciprocation, and opening and closing of coolant valve.

A plunge cut grinding device, internal grinding attachment and crowning device (for roll grinding) are available as special accessories. The American sole distributor for Schmaltz grinders is the Parker Machine Co.

Circle 70 on page 73 for more data

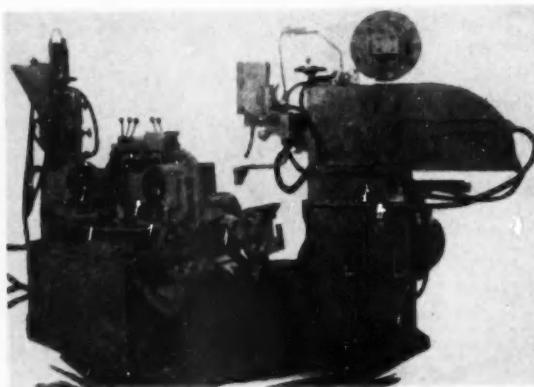


The Schmaltz hydraulic cylindrical grinder.

## Automatic Shell Welder

This special bearing shell welding machine is designed to make both internal and external welds in heavy wall bearing shells.

Manual air operated flux back-up is built into the clamping fixtures for internal welding. The operating and indexing cycles are completely automatic under operator control. Hydraulic power is used to index the table into the three positions against fixed adjustable stops. The index and welding motions are electrically interlocked to protect against improper sequencing. Other features include automatic light beam gauging of the shell seam and automatic ejection of the welded bearing shell. (Morton Mfg. Co.)



Circle 71 on page 73 for more data

## Testing Machine Has Adjustable Cycling Range

An improved model FGT SR-4 type universal testing machine having several new features is announced. The 50,000 lb capacity machine, when equipped with suitable accessories, is capable of testing specimens of structural parts and components not only in tension, compression, and flexure, but also while they are subjected automatically to alternating reversed loads, creep, stress relaxation, torsion, and shock.

One of the new improvements provides greater convenience and flexibility of automatic load reversal. With the new "load cycling" system it is possible to adjust control points by two load indicating dial knobs, at the left of the main 24-in. diameter load indicating dial, to any two loads between 50,000 lb compression and 50,000 lb tension. Cycling thus may be kept within the tension range, within the compression range, or between any tensile load and any compressional load.

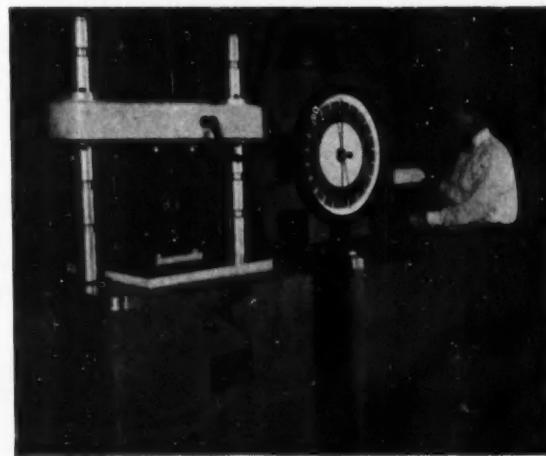
The rate of cycling depends upon strain amplitude within the machine's speed limits, which are normally nine in. per minute up to 10,000 lb load, four in. per minute up to 30,000 lb load, and two in. per minute up to 50,000 lb load. Loads are applied to the bottom platen by a single reversing power screw from a variable speed electric motor. Maximum power stroke is eight in.

The indicator dial on the new model has its zero at the top, with 1000 divisons. Four ranges are provided: 0-50,000, 0-10,000, 0-2500, and 0-1000 lb. An additional four ranges are available by use of an SR-4 Universal Load Cell of 500 lb capacity which can be mounted on the crosshead and connected into the main dial indicator.

A strain cycling system is also provided. It is controlled by means of plus and minus separation of the gage points of an SR-4 extensometer operating through an SR-4 type stress-strain recorder, which is standard equipment. For head-travel cycling, which is distinct from either load or strain cycling, the machine has upper and lower head-motion reversal stations.

Head motion speed can be held constant at any setting of the speed control knob, which is calibrated in inches per minute of platen movement between 0.025 in. per minute and nine

Operating the B-L-H SR-4 universal testing machine.



in. per minute. Constant rates of load application and strain are provided by means of pacing discs. Load pacing is adjustable from dial capacity per minute on any range down to 1/20th dial capacity per minute in either direction. Strain pacing is adjustable from 0.00025 to 0.25 in./in./min. in either direction.

A new overload clutch is among the safety devices protecting the machine.

All testing can be done within a single opening. When loaded to maxi-

mum capacity one inch from its vertical axis in any direction, the accuracy of load indications is unchanged. Accuracy is guaranteed within 0.5 per cent of load or 0.1 per cent of scale, whichever is greater. Tolerances on the lowest range are slightly more.

Horizontal clear space between columns is 21 in. and the standard maximum vertical opening between platen and crosshead is 24 in. Working space on the testing machine table is 20 x 20 in. *Baldwin-Lima-Hamilton Corp.*

Circle 72 on page 73 for more data



### Dumper

A rotary dumping unit which fits over the forks of the FF-15 electric lift truck is available. (*Automatic Transportation Co.*)

Circle 73 on page 73 for more data

## NEW EQUIPMENT



For additional information, please use postage-free reply card on page 73

### E-P Syncogear

For locations where dangerous fumes, inflammable gases, explosive substances or combustion dusts may exist, a right-



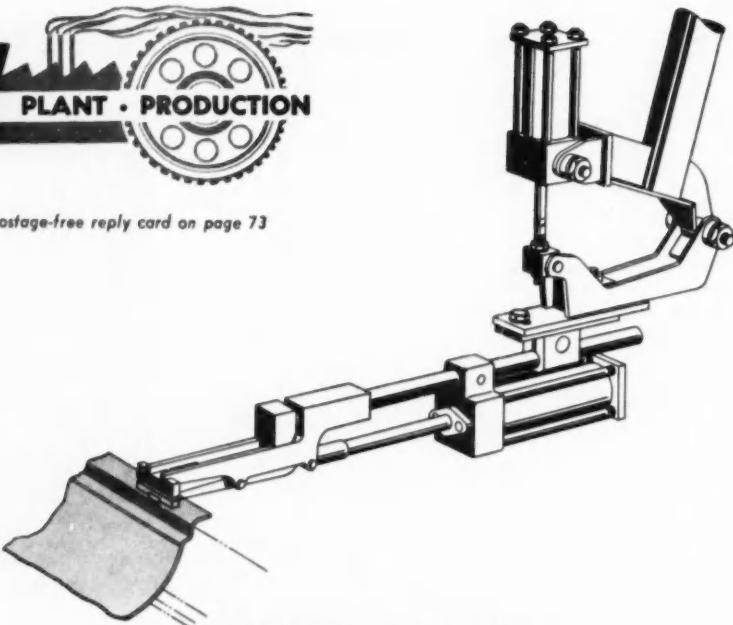
angle Syncogear with explosion-proof motor is available. This three-phase a-c motor, type SESV-GW, one hp from 45 to 155 rpm, is designed to comply with Underwriter's specifications for Class 1—Group D, and Class II — Groups F and G service. It incorporates a cantilever design to protect gear alignment. Mounting stresses are absorbed by the one-piece base, freeing the gear and motor housing of distortion. Type SESV-GW embodies splash lubrication, a hardened and ground worm, normalized castings and asbestos-protected windings. (U. S. Electrical Motors, Inc.)

Circle 74 on page 73 for more data

### Two-Stage Tube Press

A double-end tube reducing hydraulic press is specially designed to reduce both ends of a tube simultaneously. To reduce the two in. diam thin-walled seamless steel tubing to the required 1½ in. diam at each end, a two-station machine was designed, using a preliminary reduction as well as a final reduction die. These dies are mounted internally in each ram along with an internal automatic hydraulic knockout in each ram. As the ram returns, after the reduction, the knockout automatically ejects the tube.

To accommodate tubes varying from three ft to 12 ft in length in increments of six in., one cylinder block with its accompanying pumping unit and controls can be moved along the bed by means of a motor-driven lead screw. Keys across the bed take the thrust load. Tubes are fed automati-



### Lifting Jaw Automatic

Automatic unloading of large-area stampings is facilitated by a newly-designed attachment for iron hands called a "floating mechanism". The unit enables the gripping jaw to lift parts in a die 20 in. vertically before swinging out. A C-shaped hinged assembly allows the gripping jaw to pivot at the back. An air cylinder supplies the power for raising the jaw vertically. Several iron hands equipped with the new mechanism have been installed at Nash Motors for unloading inner door panels, hoods and roofs. (Sahlins Engineering Co.)

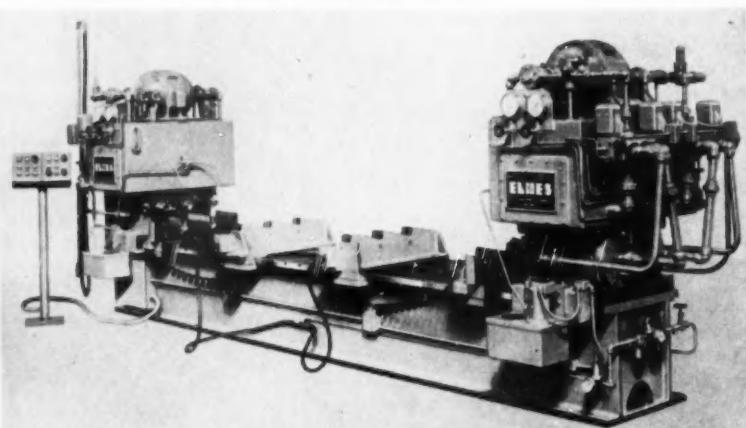
Circle 75 on page 73 for more data

cally through the machine. Air-operated tube clamps are used for the longer tubes, thus eliminating any tendency to bow during the reduction. The tube ends are lubricated prior to

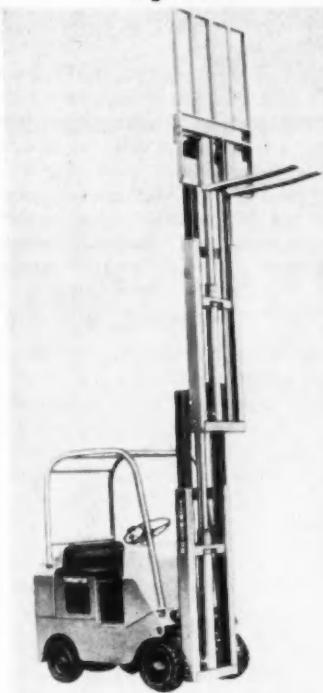
reduction by two lubricant pump and reservoir units, one for each end of the press. American Steel Foundries, Elmes Engineering Div.

Circle 76 on page 73 for more data

The Elmes press is fully automatic in operation and is capable of producing at the rate of 150 tubes per hour. The press can be designed to accommodate a wide range of tubing diameter and lengths.



## High Lift



The double telescopic mast comes in six different sizes varying in lifting height from 144 in. to 216 in. The attachment will fit four of the maker's lift trucks.  
(Towmotor Corp.)

Circle 77 on page 73 for more data

## 50-800 Cycle Sub-Fractional Horsepower Motor

Now available is a sub-fractional horsepower motor for operation over the entire frequency range from 50 to 800 c. Designated as Type A15BF-15, the motor is designed to operate on a 115-v variable frequency supply. Input is 20 w at 50 c, 30 w at 400 c, and 60 w at 800 c. Rated speeds are 3000 rpm at 50 and 400 c, 2800 rpm at 800 c.

The unit is designed for single-phase operation but is also available for two and three-phase operation. Mountable in any position, the motor uses a single winding and is provided



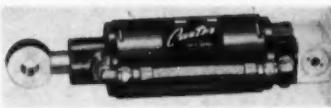
with four leads. It is reversible and can be supplied with or without fan or blower. *Air Marine Motors, Inc.*

Circle 78 on page 73 for more data

## Air Cylinder with Built-in Pilot Valve

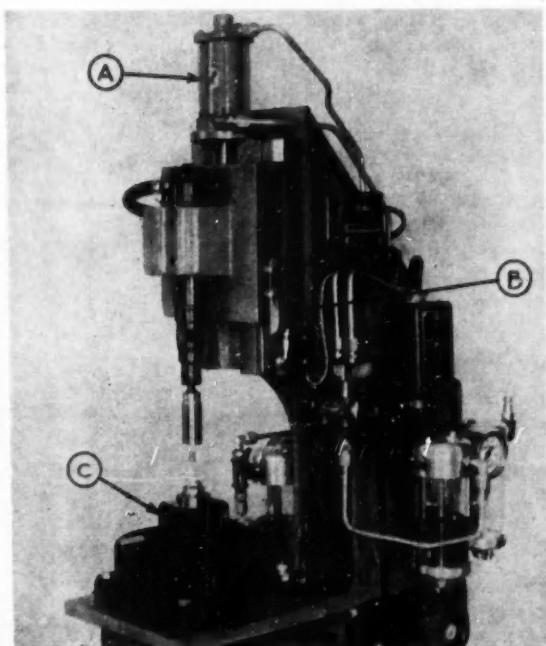
Recently announced is a line of air cylinders featuring a built-in operating valve. This type of cylinder reportedly eliminates one pipe connection usually required for a double-acting cylinder and increases efficiency of cylinder by reducing line friction.

The integral valve is of the universal type furnished so that it can be operated by miniature poppets, direct



or remote, or converted to single or double-solenoid operation. Valve can be furnished with dual-speed controls. Cylinder diameters range from 1½ through six in. *Carter Controls.*

Circle 79 on page 73 for more data



## Air Unit for Assembling Spark Plugs

A combination of electrical and pneumatic devices drives home the locking nut on spark plugs on a Crusota air press. Spark plug is placed in LS-1 Collet fixture (C). Main air valve is opened to supply collet pressure (on opposite side of machine). Micro-switch on left is depressed, momentary contact, shifting four-way double solenoid valve. Double acting cylinder (A) moves dovetail slide, carrying nut setter toward plug. Prior to setter socket engagement over hex nut of plug, cam finger (B) attached to dovetail slide trips micro-switch roller energizing two-way solenoid supplying air to nut setter. Tripping of this micro-switch also starts timer motor. The socket is controlled by a built-in clutch. Timer is adjusted to allow air to setter only sufficient to throw clutch. Solenoid controlling setter air is then reversed by timer, freeing contact pressure between socket and nut prior to upward travel of socket. Depression of micro-switch on right, momentary contact, shifts four-way double solenoid valve. Double-acting cylinder moves dovetail slide upward to original position. Upward travel of slide removes cam finger attached to slide from micro-switch de-energizing timer motor allowing for reset for next operation. 4-B Bench valve is shifted releasing LS-1 Collet fixture. Complete time cycle is three seconds.  
(Mead Specialties Co.)

Circle 80 on page 73 for more data

**NEW**

# EQUIPMENT



For additional information, please use postage-free reply card on page 73

## Vibration Analyzer

The model 553 vibration analyzer permits selective readings of steady state vibration phenomena from as many as six points on a device or machine under test, and while it is operating under any simulated circumstance of load or speed.

Originally used to study vibration in jet engines, it permits for the first time checks of vibration phenomena at full power. In use, as many as six seismically mounted inductive pickups are fastened at the points of stress to be analyzed. A six position input selector switch permits selective readings from the desired pickup.

Amplitude of vibration, peak to peak displacement, is read directly from a meter in any of four selective ranges, 0.1, 0.01, 0.001 and 0.0001 in. full scale. Frequency of vibration, in cycles per minute, is read directly from a meter in any of three ranges, 10,000, 20,000, and 40,000 cpm full scale.

A filter selector switch permits se-

lection or rejection of various vibration frequencies to analyze the most complex vibration problems as follows:

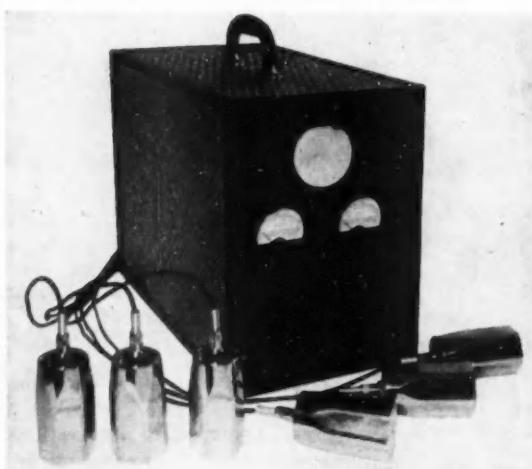
High Pass: Passes all frequencies above 4000 cpm.

Low Pass: Section 1—Passes all frequencies below 8000 cpm. Section 2—Passes all frequencies below 16,000 cpm.

Combination: 1—Band pass 4000-8000 cpm. 2—Band pass 4000-16,000 cpm.

The permanently calibrated inductive-type vibration pickups have a frequency range of from 500 to 40,000 cpm, and an amplitude range from 0.1 in. to 0.000002 in. Sensitivity is 105 mv per 0.001 in. peak-to-peak amplitude at 60 cps. The pickup is relatively unaffected by temperature ranging from -25 to 250°F. *International Research and Development Co.*

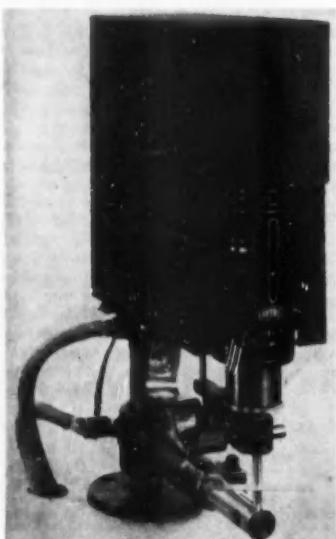
Circle 81 on page 73 for more data



The Model 553 vibration analyzer with six pickups.

## Welding Head

Now available are the latest units comprising the "Weldpower" line of welding equipment. The "ILS" head,



which replaces the former "G" head, embodies many refinements and improvements to increase the efficiency of the unit, according to the maker.

The head is designed for use with the Model 225A "Weldpower" control unit. Press type and foot-operated, the unit is equipped with pressure and follow-up controls, as well as a visual pressure scale. The lower electrode may be used on a vertical or horizontal plane. *Raytheon Mfg. Co.*

Circle 82 on page 73 for more data

credibly smooth, temperature inert, rigid over-all and moisture repellent. These layout plates, being black granite, have no glare. If accidentally nicked, the surface accuracy is not impaired, as the surface will not rise around the nick. *Collins Microflat Co.*

Circle 83 on page 73 for more data

## Granite Layout Plate

A line of black granite layout plates recently developed is now on the market. Differing from surface plates, the layout models do not have clamping edges, but are straight-sided. The surfaces of the layout models are finished to an accuracy up to 0.0002 in. per foot.

They are non-rusting, non-warping, non-deflecting, easily washable, in-



# NEW

# PRODUCTS.

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 73

### Set and Cap Screws Have Improved Points

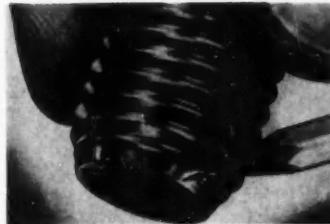
A smaller cup point for set screws in production will replace ASA cup point set screws in a standard line.

This new point demonstrated greater locking at all measured installation vs. removal torque pressures, uniformly high shaft holding power in torque resistance tests, unequalled

performance under vibration and more complete shaft contact pattern.

A new unthreaded leader point has been developed for cap screws (as pictured), designed to reduce the cause of screw thread injury and damage to threaded holes. *Allen Mfg. Co.*

Circle 26 on page 73 for more data

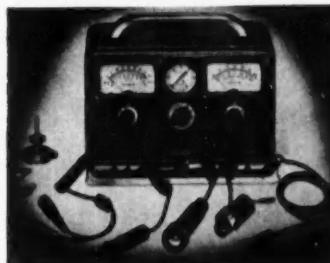


### Electronic Tester Saves Time by Group Checking

A six and 12-volt electronic testing instrument—the Uni-Tuner—makes it possible to test the complete automotive ignition, generating, starting, and compression systems, with only seven key tests, in less than 10 minutes. The tuner tests engine components by related groups. For example, the mechanic can check the battery side of

the ignition coil and by so doing, completely checks the entire primary circuit up to that point. Both the mechanical and vacuum advance of a distributor can be checked with the unit in operation on the car. The portable unit mounts on the radiator cap. *Allen Electric and Equipment Co.*

Circle 27 on page 73 for more data

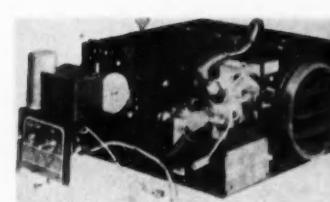


### Heater Disassembly Time Cut to Ten Minutes

The vehicle gasoline heater model UH47-2 has been redesigned to cut disassembly time for servicing and repairs to less than ten minutes. A fully automatic, thermostatically controlled heater operating independent of the vehicle engine, the UH47-2 is

designed for use in gas or Diesel truck cabs, sleeper cabs, delivery vehicles, walk-ins, utility trucks and small buses. Components of the improved model are accessible for quick removal in three steps. *Hunter Mfg. Co.*

Circle 28 on page 73 for more data



### Wobble-Rod Air Valve for Pneumatic Circuitry

Recently announced is a wobble-rod air valve for pneumatically-operated equipment. The lever which opens and closes the valve is a hardened rod so swiveled that the free end can move vertically, laterally, diagonally, or in arcs and circles. Thus, the valve reportedly can be actuated by all manner of motions.

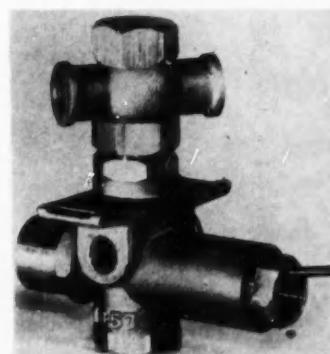
The unit's internal exhaust valve, it is claimed, will automatically discharge an air cylinder, line, or receiver when the valve closes, but can

be eliminated where it is desirable to hold air line pressures after the valve has done its job. Another integral feature is a check valve (ahead of the ball-and-seat) to prevent backsurge.

The valve has both right and left-hand outlets and reportedly will operate in any position. It commonly serves as a pilot valve.

The unit is said to have a range of usefulness up to 125 psig. Weight is 2 1/4 lb. *Pantex Manufacturing Co.*

Circle 29 on page 73 for more data



# NEW PRODUCTS.

For additional information, please use postage-free reply card on page 73

## Valve-Gapper

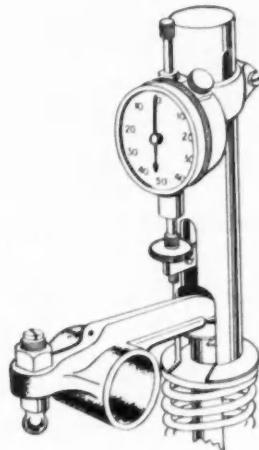
The Valve-Gapper was designed to set valve clearance on engines with overhead valves. It measures the travel of the valve rocker arm prior to contact with the valve stem. This measurement is transmitted to a dial indicator gauge graduated in thousandths of an inch. The dial permits a positive, visual setting of valve clearance regardless of wear or pitting of the valve rocker arm.

Hydraulic valve lifters can also be visually checked with this instrument. The Valve-Gapper is placed on the valve rocker and with the engine running, the smallest gap will register and be as obvious to the car owner

as it would to the skilled mechanic.

Models are now available for most gas and Diesel engines with overhead valves. A special model designed for General Motors Diesel engines has a triple use. In addition to setting valve gap, this model permits visual timing of injectors, and balancing of the fuel injector racks by engine operators as well as skilled mechanics.

In setting valve gap, the device is positioned on the valve rocker arm with the base resting on the valve keeper, and the movable bracket hooked on the edges of the valve rocker arm. As the rocker arm moves toward the valve stem, the bracket moves with it until contact is made.



This movement is registered on the dial indicator. As soon as the rocker arm contacts the valve stem, the entire tool moves downward with the valve. The only movement registered is that of the rocker arm prior to contact with the valve stem. *P & G Mfg. Co.*

*Circle 30 on page 73 for more data*

## New Performance Test Instrument Models

Recently introduced are three new models of the PerfOMeter, a self-contained instrument for measuring car and truck performance (see page 80, AUTOMOTIVE INDUSTRIES, Jan. 1, 1953). The new models are No. 410 with a diameter of 4½ in., No. 330 with a diameter of 3¾ in., and No. S-330 with the same diameter as the second. This third model is fitted with a large suction cup and special clamp for adhering to the windshield or driving panel. The other two are mounted to steering column or dashboard.

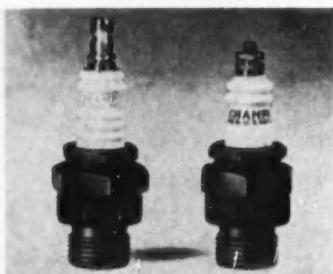
The two-scale dial of the device is said to function as an accelerometer to measure road horsepower and as a decelerometer to measure the condition and efficiency of the vehicle's braking system. By using the power scale, it is claimed that a driver can "trouble-shoot" an engine for early or late ignition timing, flat carburetion, weak fuel pump, poor spark plugs or pitted distributor points.

The resistance scale reportedly pinpoints poor wheel alignment, a dragging brake shoe, or high engine resistance. *Autosphere Corp.*



*Circle 31 on page 73 for more data*

## Spark Plug



An improved outboard racing spark plug, one able to withstand high heats of full throttle and which shows no fouling tendencies when speed is cut for the turns, has been introduced.

Designated as the new R-2-S, the

improved plug (left) represents a complete redesign of the older R-2-S model which it will supersede. Improvements include an aluminum oxide insulator with five-rib design which provides greater dielectric area to minimize flashover; a longer insulator nose at the firing end to offer a wider fouling path; and a new terminal stud to receive either spade or regular cable terminals. *Champion Spark Plug Co.*

*Circle 32 on page 73 for more data*



light blue or light bronze. The model R7-K includes a quality six in. by nine in. oval speaker with 2.15 oz magnet, a three-way switch, knob, dial plate, stamped metal baffle plate with tamper-proof metal screening, and 15 ft of cable. *Lowell Mfg. Co.*

*Circle 33 on page 73 for more data*

*(Turn to page 108, please)*

# Free INFORMATION SERVICE

Postage-Free Postcards Are Provided Here for Your Convenience to Obtain FREE LITERATURE and Additional Information on NEW PRODUCTION AND PLANT EQUIPMENT, AND NEW PRODUCTS Described in This Issue of AUTOMOTIVE INDUSTRIES. Please Circle Code Numbers of Items in Which You Are Interested, Print Name, etc., and Mail Promptly for Quicker Service.

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## FREE LITERATURE

### Barrier Paper

A collection of technical bulletins and samples of VPI rust preventive papers are available in an attractive folder. Descriptions of uses for protecting bare steel or aluminum in manufacturing and storage are given. VPI is a volatile corrosion inhibiting chemical patented by Shell Development Co. *Orchard Paper Co.*

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### Tool Facilities

A catalog, 2.5M, of facilities available and the current product line of this firm shows a wide range of plug and dial gages, special tools, sanding machines, and electrical devices. *Lincoln Park Industries*.

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### End Wheel Presses

End wheel presses of all types are described and illustrated in a new two color catalog No. 4-A just issued. Specifications for standard, medium and deep throat presses of fixed bed and adjustable bed designs are included. *E. W. Bliss Co.*

*Circle 3 on postcard for free copy*

### Plastic Resin

Uses and properties of a dimensionally stable tooling plastic suitable for models, prototypes, dies, and fixtures are described in a new brochure. *Resinite Plastics, Inc.*

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### All About Felt

"Felt Data Book" is said to be the most complete book of its kind. It lists the basic functions of felt, standard specifications and methods for testing felt. Included are design applications for wicks, seals, vibration control, and special treatments for some 40 uses of felt. *Western Felt Works*.

*Circle 5 on postcard for free copy*

### Rubber Parts

A four-page, two-color illustrated brochure outlining facilities for producing quality rubber products through engineered compounds, has been published. The firm is a major producer of O-rings for hydraulic and pneumatic design applications, made to MIL and commercial specifications from proven synthetic and silicone rubber compounds. Its facilities for formulation and manufacture of molded, lathe-cut, die-cut and bonded-to-metal products from natural, synthetic and silicone rubber compounds, are fully explained. *Goshen Rubber Co.*

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### Induction Heaters

Two bench type, two position induction heating generators, of 2½ and 3½ kw, are illustrated in the latest Ther-Monic bulletin. *Induction Heating Corp.*

*Circle 7 on postcard for free copy  
(Please turn page)*

12/15/53  
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**Special Machinery**

Buyers of special machine tools will be interested in an attractive, 12-page booklet which features the story of the firm's new \$5 million Special Machinery Div. opened recently. Illustrated throughout, the booklet gives a complete description of the customer engineering service; as well as research engineering, manufacturing and sales information. *Kearney & Trecker Corp.*

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**Stampings**

The eighth in a series, "Metal Stampings" shows engineering drawings and specifications for hundreds of parts which are available on order, many without die charges. The line includes tubing and wire clamps, pipe clamps, expansion plugs, retainers, washers of all kinds, and many others. *Kickhafer Manufacturing Co.*

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**Silver Brazing**

A loose-leaf booklet now available collects a number of data sheets on silver brazing. Included are properties and uses of seven alloys, a list of applications, a discussion of metal cleaning and fluxes, heating methods, a tabulation of composition of over 30 alloys by brands, and GB price lists. *Goldsmith Bros. Smelting and Refining Co.*

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**Model EE Lathes**

A factual 20-page, profusely-illustrated booklet, No. 502, just issued emphasizes the time-conserving and cost-saving adaptability of the 18 in. Model EE precision lathe for both manufacturing and toolroom applications. The booklet points up six specific new design advances incorporated in this dual-purpose machine. Attachments supplied as standard equipment and optional accessories available are also briefly described and clearly illustrated. *Monarch Machine Tool Co.*

*Circle 14 on postcard for free copy*

**Silicone Primer**

Data sheet 7-100 is an attempt to clarify the silicone paint situation for the ultimate buyer and consumer. Written in layman's language, it explains the differences in terms of performance, between categories by vehicle content, types of resins, modifying resins, and pigments. Examples are given and general recommended application methods are discussed. The use and performance of silicone fluid additives for organic-based finishes are also mentioned. *Dow Corning Corp.*

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**Steel Treating**

Facilities for complete steel treating are displayed in a 12-page brochure describing a new plant. *Lakeside Steel Improvement Co.*

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(See preceding page)*

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12/15/53

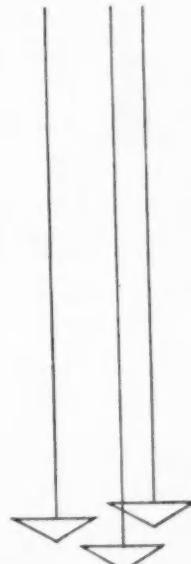
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**Press Limit Switch**

Developed to meet the specific needs of mechanical press automation devices, a rotary cam limit switch has been announced in bulletin No. 1600. It features external adjustment during operation of the press. This provision simplifies the synchronizing to the press cycle of independently powered press auxiliaries since the press can be stroked while individual switches are being adjusted. *Danly Machine Specialties, Inc.*

*Circle 11 on postcard for free copy*

Millions of tons  
 of boron steels  
prove the efficiency  
and economy  
 of Vancoram



# GRAINAL ALLOYS

Vancoram GRAINAL Alloys have been used to produce millions of tons of boron steels—and demand for these multiple element alloys is still growing. Here's why . . .

GRAINAL Alloys have proved invaluable in defense production, and are equally important in the making of steels for peacetime uses. They replace costly elements with respect to hardenability and other properties. They accomplish this through tailor-made composition that removes the element of chance from the steelmaking process. That's why the vast majority of all boron steels made today are made with GRAINAL Alloys.

Second, in stainless steels, small additions of GRAINAL Alloys improve hot working

characteristics, cut conditioning costs, increase output—pointing the way to another major GRAINAL application.

As part of its long-range program for keeping in step with America's expanding metals industries, Vanadium Corporation has installed at its new plant at Cambridge, Ohio, additional facilities for the production of GRAINAL Alloys.

For complete information on GRAINAL Alloys and other Vancoram products, contact your nearest Vanadium Corporation representative.



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# NEW

# AIRCRAFT PRODUCTS



FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 73

## Actuator

A compact, light-weight unit now available provides rotary output up to 15 watts at speeds from 16 to 195 rpm (maximum permissible torque is 25 lb-in.). It features an integral, slipping-gear type, torque limiting device which prohibits unit damage



through inadvertent overloading or jamming. It is approximately 1 1/4 in. square by 5 1/4 in. long without filter; weight is as low as 0.95 lb without filter. This unit is driven by a standard Lear 26 volt, dc motor including a brake, or combination clutch-brake, to aid in accurate positioning. Optional in this unit are a radio noise filter, motor thermal protection, end position limit switches, output shaft configuration, speed and torque and AN connector. *Lear, Inc.*

Circle 46 on page 73 for more data

## D-C Motor

A miniature d-c motor is currently being produced for use in bomber defense systems.



About 1 1/8 in. in diameter and 2 1/8 in. long, the motor weighs approximately eight oz. Rated at 0.002 hp at 6500 rpm, it is so sensitive that it is controlled by the output of two small vacuum tubes.

Of the split-shunt, reversible-rotation type, drawing maximum armature currents of 0.8 amp from a 28-

volt line, the motor is required to withstand a high potential of 1500 volts above the ground. It is capable of responding to field currents of 0.00075 amp. *General Electric Co.*

Circle 47 on page 73 for more data

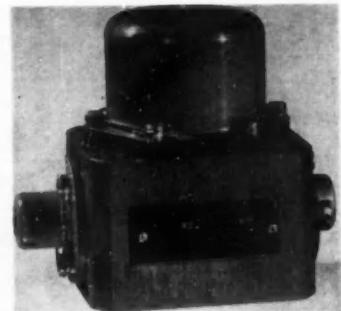
## Probe

With an improved thermocouple probe, regardless of flight altitude, engine speed, or temperature level, the exhaust-gas temperature of a



turbo jet engine without reheat can be sensed with negligible error and with fast response. The new rugged design is claimed to be effective in minimizing the usual errors of indication due to recovery, radiation, and conduction as found with other probe designs. *Aero Research Instrument Co.*

Circle 48 on page 73 for more data



is applied to the valve spool in opposition to the valve spool return springs. This method of valve operation results in exceptionally high level spool driving forces which minimize spool friction and acceleration forces.

Normally the valve input is from a balanced push-pull d-c amplifier and the valve output flow is applied to a piston or hydraulic motor. An electrical signal proportional to the piston position or motor angular rotation is fed back to the amplifier to give a closed servo loop. Loop natural frequencies of 65 cps can be obtained with an uncompensated amplifier. *Moog Valve Co.*

Circle 49 on page 73 for more data

## Servo Valve

The model 500 electro-hydraulic servo valve has been announced, consisting of a group of proportional type, electrically actuated hydraulic four-way valves featuring no mechanical linkage. These valves are designed to control any maximum desired output flow from 0.5 to 8.0 gpm in hydraulic systems from 1000 to 3000 psi. Standard signal input for full output flow is a differential current of  $\pm 8.0$  ma, with lower or higher signal levels also available.

The valves have a frictionless first stage push-pull hydraulic amplifier which requires a continuous oil flow of 0.1 gpm. This oil is internally filtered by sintered bronze elements and magnetic traps. The input is a polarized solenoid which is motivated by a coil. The output of the first stage is a differential hydraulic pressure which



such as are encountered in jet aircraft fuel systems. The swivel fitting rotates easily through 360 deg. It is licensed for production to *Peerless Machine Co.*

Circle 50 on page 73 for more data  
(Turn to page 122, please)

# Need low cost, quick assembly, long bearing life?

here's how manufacturers of automotive components

get them with **NEEDLE BEARINGS**

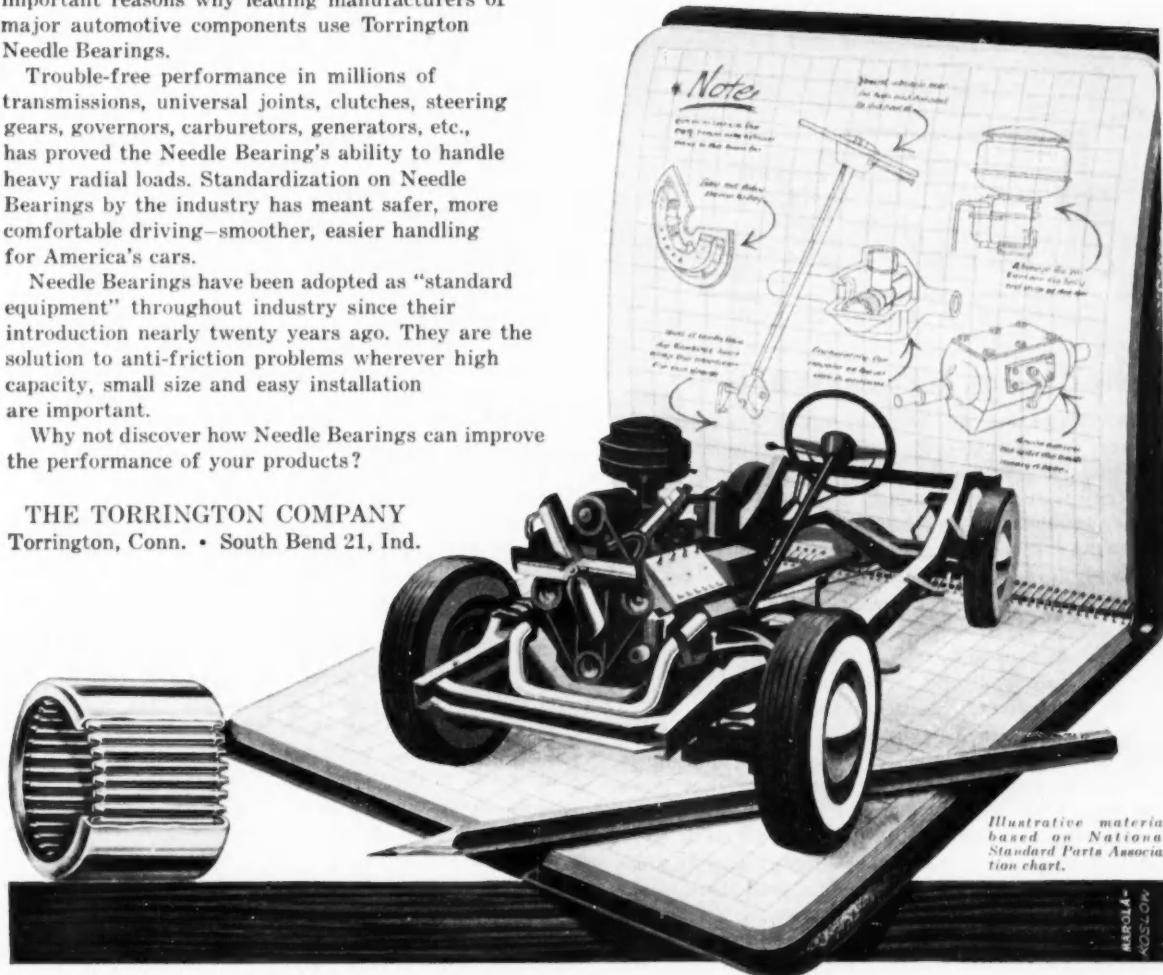
Low initial cost and ease of installation are two important reasons why leading manufacturers of major automotive components use Torrington Needle Bearings.

Trouble-free performance in millions of transmissions, universal joints, clutches, steering gears, governors, carburetors, generators, etc., has proved the Needle Bearing's ability to handle heavy radial loads. Standardization on Needle Bearings by the industry has meant safer, more comfortable driving—smoother, easier handling for America's cars.

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# The BUSINESS PULSE

*Short Term Business Outlook Fairly Good, Even When Slackening in Durable Goods Sales Is Taken Into Account. Rate of Inventory Growth Has Declined, But Still Seems Higher Than Warranted by Sales Trend.*

This Survey Is Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

## **Little Change in Business Rate**

The slower rate of business which developed last summer has persisted throughout the autumn period without any marked change of pace. The downward tendency is still rather gentle, and thus far measures of aggregate activity have shown only minor losses and price movements have been limited.

Recent statistics, however, do indicate one qualitative change. At first the downward pressure was centered almost completely in durable goods, whereas recently it appears to have carried over into soft goods as well. Petroleum and petroleum products and also textiles have already been affected to a considerable degree, and of late certain other nondurables industries have shown a tendency to slow up. The importance of this development lies in the fact that there had been hope in some quarters that the dip in the durables sector would be counterbalanced to a large extent by firmness in nondurables lines. Just at present this hope appears poorly founded, and there would seem greater likelihood that the developing softness in durables, if it continues, will ultimately tend to accelerate any further decline in general activity that may occur.

Even when the slackening in durables is taken into account, the short-term outlook still seems pretty good, to judge from present tendencies and prospects in the major components of gross national product.

## **No Sharp Reduction in Defense Spending**

According to officials of the Defense Department, national security expenditures have probably reached their peak, but it is emphasized in official statements that there will be no sharp reduction from this peak in the early future. This means that effective demand

from the governmental sector will continue to be a sustaining influence. Moreover, surveys of business intentions with respect to plant and equipment expenditure next year indicate a surprisingly small reduction in over-all outlay below the high 1953 level. Similarly, an official forecast on construction expenditures in 1954 places combined public and private outlay at about \$34 billion, off only two per cent from this year's anticipated total. Finally, the outlook seems favorable for a continued high volume of consumer expenditures in the immediate future. The rate of saving from disposable income has been moving lower for some time, with good prospects that this tendency will continue. In addition, there will be the stimulus of the 10 per cent reduction in personal income taxes on January 1.

There are, of course, some offsetting considerations. The rate of inventory growth has declined, but it still seems to be higher than is warranted by the trend of sales. Thus some actual "disinvestment" in inventories is clearly a possibility. And while it is true that Government expenditures will continue close to present levels in the early part of 1954, the first half of the year will see a tremendous inflow of tax funds to the Treasury because of the concentration of corporate tax payments in the first half of the year under the Mills plan. Nevertheless, even when these qualifying considerations are taken into account, it still seems probable that the sustaining forces noted above will be more important on balance and will tend to militate strongly against any precipitate drop in early 1954 in business volume.

## **Outlook for Late 1954**

The longer-term outlook—for late 1954 and thereafter—is naturally much less clear. The consensus at present seems to be that business will continue generally favorable in this future period also and that no economic downswing of very serious proportions is in the offing. This view is likely to be borne out if present adjustments now under way in particular industries are completed in good time. If, however, the need for adjustment should prove greater than industry analysts now estimate, with the result that the process of adjustment were extended, the forces of recession might tend to interact and reinforce one another, causing a sharper ultimate drop in activity than present

(Turn to page 84, please)

✓ Better than any ring set without **CHROME**

✓ Better than any other **CHROME** ring set

## Sealed Power KromeX FULL-FLOW RING SETS



**3** vital surfaces are  
**CHROME**  
**protected**

Top Compression Ring of chrome-alloy cast iron has solid chrome face, factory-lapped to a light-tight finish, with sides Granosealed for greater flexibility.

MD-50 Steel Oil Ring with the Full-Flow Spring has chrome faced side rails for double mileage, with sides Granosealed for greater flexibility.

All rings in Sealed Power KromeX Ring Sets are beveled or tapered to thread-line contact for quicker seating and blow-by control.



Best for Fighting Heat, Friction, Corrosion, Abrasion

## Sealed Power Piston Rings

SEALED POWER CORPORATION • MUSKEGON, MICHIGAN

Sole manufacturers of KromeX Ring Sets, MD-50 Steel Oil Ring, Full-Flow Spring, Flex-S Flexible Oil Ring, and GI-60 Groove Inserts.  
Leading Producer of Automatic Transmission Rings, Power Steering Rings and Non-Spin Oil Rings.

# News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Continued from Page 23

## GM 1954 Motorama To Open Jan. 21

General Motors will open its 1954 Motorama series with the first showing at the Waldorf in New York Jan. 21 through 26. The itinerary has been reduced for next year and will include only four cities—New York, Miami, Los Angeles, and San Francisco. GM will put particular emphasis on engineering and research displays in the 1954 shows.

## Ford Official Reveals 1946 Operating Loss

Some interesting information about Ford's financial condition just after World War II and its subsequent improvement was revealed for the first time recently. It was disclosed in a talk by R. E. Roberts, manager of employee relations, before the Chicago chapter of the Society for the Advancement of Management.

Mr. Roberts said that the company in 1946 had a deficit of \$52 million and that its losses were running nearly \$9 million a month. He added

that impartial surveys showed its chief competitor held a nearly two to one production preference with the public, and that Ford was behind competition in styling, design, mechanical features, and advanced engineering.

As a result of the company's decentralization program and complete staff reorganization, Ford has made outstanding progress since 1946, he said. By the end of the 1951 model year, the company had reduced its manufacturing costs by approximately \$330 million a year, compared with the second half of 1949.

Mr. Roberts also said that Ford will spend an additional \$500 million over the next three years for new facilities and modernization. This will be in addition to the \$1 billion already spent since 1946 on expansion.

## J-57 Engine to Power Two Other Aircraft

The Pratt & Whitney J-57 turbojet engine (see AUTOMOTIVE INDUSTRIES, Dec. 1, p. 39) has reportedly been designated to power two more types of planes in addition to those already announced. They are the Douglas F4D Skyray and the A3D.

## World Motor Sports Show Dates Revised

Dates for the Second Annual World Motor Sports Show in New York have been changed to Jan. 23 through 31. The change was made to accommodate many exhibitors who preferred it to the original Feb. 20 to 28 dates.

## Buick Prepares to Fight for Third Place in Sales

At a recent press conference and preview of its 1954 models, Ivan L. Wiles, general manager, Buick Div., General Motors Corp., expressed the hope that Buick next year would top its 1950 record sales and thus move into third place in the automobile industry. The achievement of this goal would displace Plymouth from the No. 3 spot and would move Buick up from the fourth position it has held since 1938.

Buick is prepared to seize the challenge with its recently completed construction program and now has 10 million sq ft of floor space at Flint, Mich. It was revealed that the division stopped providing Cadillac and Oldsmobile with Dynaflow automatic transmissions on Dec. 12.

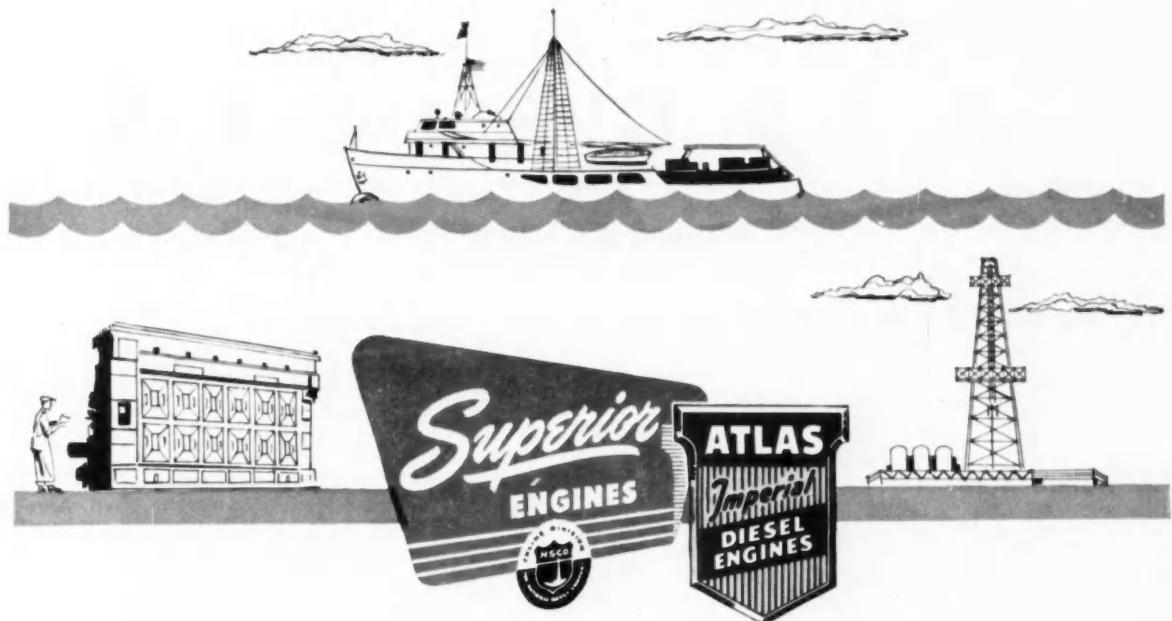
(Turn to page 93, please)



## ENGINEERING—TESTING UNITED UNDER ONE ROOF

The recently opened Technical Center of National Malleable and Steel Castings Co., Cleveland, O., represents a practical and efficient combination of engineering and testing facilities for railroad couplers, automotive parts, etc., that stand out as a hallmark of achievement in the foundry industry. The center consists of four closely coordinated sections: a complete physical testing laboratory

with a broad range of testing equipment, including electronic measuring and recording devices; an engineering department which develops products, engineers production methods, and provides technical services to customers; a proving ground, with test tracks, car pits, and specially equipped railroad and mine cars; and administrative quarters and meeting rooms for discussion of projects.



**FAMOUS ASHORE AND AFLOAT...  
AND EQUIPPED WITH THOMPSON VALVES**

In any oil field . . . you'll see Superior Engines driving rotary tables, mud pumps, and draw-works.

At the Municipal Electric Plant in many towns and villages you'll see Superior Engines humming day and night to provide low-cost electric power for the community.

In the engine rooms of a tuna-fishing clipper on the West Coast, a powerful Mississippi River tow-boat, or an East Coast tug . . . there will be the familiar name-plates of Superior and Atlas engines . . . products of the National Supply Company's Engine Division.

Thompson Valves help achieve the day-after-day dependability, the low maintenance, and the fuel economies for which Superior and Atlas Engines are noted.

Take a tip from National Supply and other famous engine builders . . . look to Thompson for valve engineering leadership.

**VALVE DIVISION**

**Thompson Products, Inc.**

DEPT. VG-12 • CLEVELAND 17, OHIO



# AIR BRIEFS



By ROBERT McLAREN

## Air Force Size

Washington "insiders" reveal that the 1955 fiscal year budget will call for a 127-wing Air Force, an increase of seven wings over the current "interim" program but 21 wings less than the Truman program. Significantly, six of the seven new wings will be interceptors for the Air Defense Command, indicating a switch in strategic thinking in the Pentagon from the "overwhelming retaliatory" force of strategic bombers to a greater accent on defense from air attack. Air Force planners are apparently facing the fact that the Boeing B-52 eight-jet bomber, while considerably faster than the B-36, can't make the Moscow round trip without air refueling, which always risks an aborted contact.

## Titanium Future

Following Los Angeles hearings by the Senate Strategic Metals Subcommittee, Air Force Secretary Harold E. Talbott announces that he is now "thoroughly alive" to the problem of increasing titanium production and promises that the Air Force will move quickly in that direction. Aircraft industry leaders in Los Angeles stated flatly that, in the aggregate, they would need several hundred thousand tons of the critical metal by 1956 at the latest. Current production program is only 25,000 tons annually. The program is wholly controlled by the Government through contracts let by the General Services Administration. To date GSA has ordered only 13,800 tons. Actual titanium production this year will be only 2000 tons. Most aircraft company spokesmen say that their future airplanes will use up to 60 per cent of their structural weight in titanium. Not only does titanium have a remarkable strength-weight ratio as an aircraft structural material, but it exhibits promising heat-resistant characteristics, which are rapidly becoming the criterion for supersonic aircraft and missile metals.

## Mail Trouble Brewing

The Post Office Department, which recently inaugurated first-class-mail-by-air between Chicago-New York and Chicago-Washington, has declared that where there are competing airlines over a route it will hand the mail to the line with the lowest charge. This, of

course, is sound business sense. But this simple, fundamental approach is throwing the Civil Aeronautics Board into a turmoil because of the Board's complex system of mail rates now in effect. For reasons which only the Board seems to comprehend, different airlines receive different rates of payment for transporting air mail and these rates are firmly fixed by law. The result is that mail pay rates vary from as low as 45¢ a ton-mile to as high as 67¢ a ton-mile, depending upon the airline. The policy decision of the Post Office will mean that only "45¢ airlines" (American, Eastern, TWA and United) will get the mail while the "53¢ airlines" (Capital, Braniff, Delta-C&S, National, Northwest and Western) will have to do without. What will happen, of course, is that the latter carriers will petition the Board for a reduction in their pay rates, and this is about as complex an issue as can be brought before the Board, which has spent the last seven years working out the present schedule. In general, however, airline heads are privately happy at the turn of events, which should force the whole situation into the open and, probably, into the White House, which is already highly critical of the entire operation of the Board. For example, Pan American receives 67¢ a ton-mile for carrying U. S. Mail between San Francisco and Honolulu while United Air Lines receives only 45¢ a ton-mile over the same route!

## First Half-Century

As this Fiftieth Anniversary year comes to a close, a fitting climax is provided by the flight of a man at twice the speed of sound. The accomplishment was made by NACA test pilot Scott Crossfield piloting the Douglas D-558-II Skyrocket research airplane at a speed of 1327 mph. Previously, the Skyrocket had attained an altitude of 83,235 ft with Marine Corps Lt. Col. Marion Carl at the controls. These phenomenal achievements are appropriate milestones for the first half-century of powered flight and points-of-departure for the second half-century. These performances do not become official world's records since in both cases the Skyrocket is carried to an altitude of about 30,000 ft mounted in the belly of a Boeing B-29 bomber and released for flight.

(Turn to page 144, please)

# *Audible Alarm* PLUS A *Visual Signal*

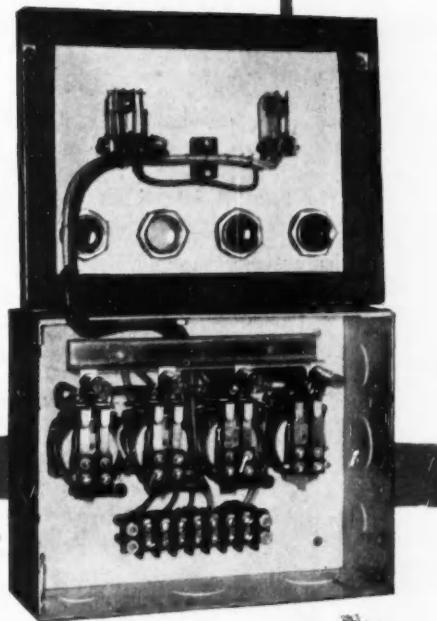
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**SAFETY  
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SETS**

A dependable safety alarm set at a price well within the budget of every engine owner. One failure will more than repay the cost of the control in the saving of repair bills and loss of service.

Provides a visual signal combined with an audible alarm for any number of safety signals desired; a light to show when the control is operative; a test switch to check all failure circuits simultaneously, and an alarm silencing button with automatic reset. These sets also can be furnished with a shutdown circuit to stop the engine before damage can occur if the trouble is not corrected soon enough.

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**IN CASE OF—  
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OVERHEATING, ETC.**



**SYNCHRO-START PRODUCTS, INC.**

*Automatic Engine Control Equipment*

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SKOKIE, ILLINOIS

# The BUSINESS PULSE

(Continued from page 78)

opinion holds probable. The fact is that the course of development beyond the early part of 1954 seems to hinge on how much correction is needed, a matter on which the evidence is hardly conclusive at this time.

Present declining tendencies in the economy continue to be most conspicuous in certain of the basic indus-

tries, such as steel, automobiles, petroleum and textiles.

## Competition Among Steel Producers

At present the defining characteristic of the steel situation is steadily growing competition. The

knowledge that supply has at last overtaken demand is apparently conditioning the actions of steel consumers, who are behaving cautiously, well aware that they can now get most of the steel items they want when they want them. Orders are now being placed only 30 to 60 days ahead of desired delivery, whereas earlier in the year consumers were placing orders as far ahead as 90 to 120 days. As a result of this situation, competition among producers is on the rise, with the practice of freight absorption becoming increasingly important. Ingot production, which held steady at about 95 per cent of capacity through October, has subsequently eased moderately. Operations, however, continue to be profitable, and this is expected to hold true in the immediate future.

Developments in the petroleum and automobile industries continue to reflect heavy inventory situations. In both cases rather substantial production cutbacks have been ordered, and competition has mounted. Statistics available at present indicate that the inventory situations have not as yet been fully corrected in either instance; indeed they do not conclusively indicate that material progress has been made. Thus in each case the problem of adjustment is expected to persist for some time.

## Moderate Decline in Employment

Cutbacks in these and other industries have resulted in a moderate decline in nationwide employment and in some increase in claims for unemployment insurance benefits. However, unemployment expressed as a percentage of the total labor force continues close to the practical minimum, and there is no evidence of hardship of any widespread importance.

Declines in employment, at first evident in the durables area, have apparently begun to carry over into the nondurables sector, a development which parallels experience in production and other series.

While both durable- and nondurable-goods industries now seem to be tending lower, available evidence indicates that, if the downward pressures continue in both sectors, the decline may well be steeper in hard goods. Lately new orders coming into durables manufacturers have run substantially behind sales, causing a dip in order backlog and a deterioration of inventory-sales ratios. In nondurables, by contrast, the recent experience of manufacturers with respect to sales, orders and inventories has been more favorable.

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Special Engineering with...

Lamb Electric

SPECIAL APPLICATION  
FRACTIONAL HORSEPOWER  
MOTORS

• Every Lamb Electric Motor is specially designed for the product or device it is to drive. This means that both electrical and mechanical characteristics are engineered for the exact requirements of the particular application, often resulting in savings in space, weight and cost factor.

Special engineering in Lamb Electric Motors assures optimum product performance and efficient, long-life motor operation...another reason why more and more of America's finest products are being powered with Lamb Electric Motors.

The Lamb Electric Company  
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In Canada: Lamb Electric—Division of Sangamo Company Ltd.—Leaside, Ontario



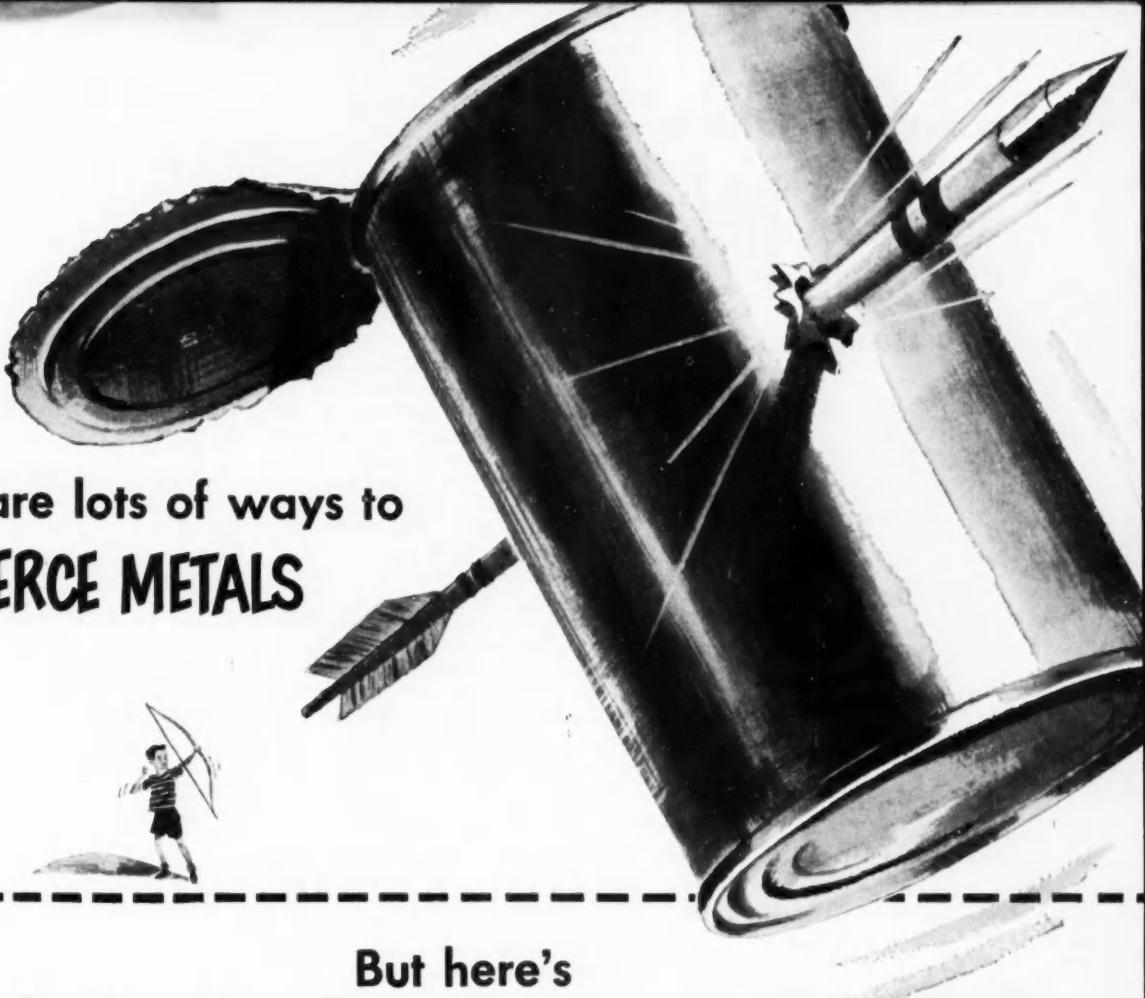
Having inbuilt control switch and receptacle, this motor is readily adaptable to portable tools and equipment.



Where intermittent high torque and space economy are important, this specially developed aircraft motor provides distinct advantages.

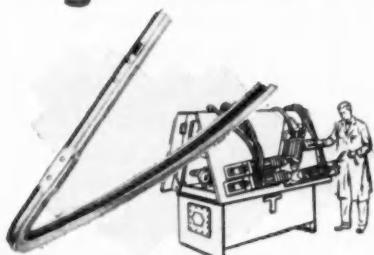
Lamb Electric

SPECIAL APPLICATION  
FRACTIONAL HORSEPOWER MOTORS

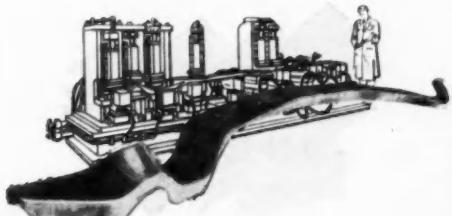


There are lots of ways to  
**PIERCE METALS**

But here's  
**High Production Piercing in a single set-up**



Seven irregular holes and two trimming operations complete this car door inner window frame in one setup. Model changes can be made at low cost.



More than 40 holes in this automotive frame member are pierced simultaneously on a Danly machine built expressly for this purpose.

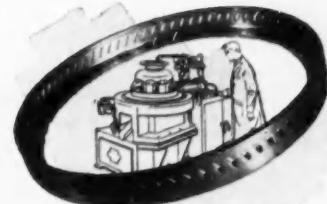
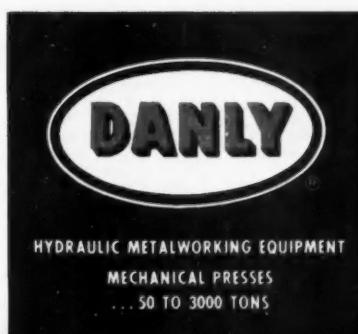
#### **DANLY HYDRAULIC METALWORKING EQUIPMENT**

Now you can pierce multiple holes of practically any type—round, oblong or irregular—to very close tolerances in a single setup. Capacity of Danly Metalworking Equipment can be as high as 225 tons per hole with break-through shock practically eliminated. Each station hydraulically strips its punch, greatly simplifying fixturing. Custom-built for your piece part, Danly Hydraulic Metalworking Equipment enables you to pierce more holes faster and more accurately—in one operation. Write for the special bulletin shown at right today.



#### **DANLY MACHINE SPECIALTIES, INC.**

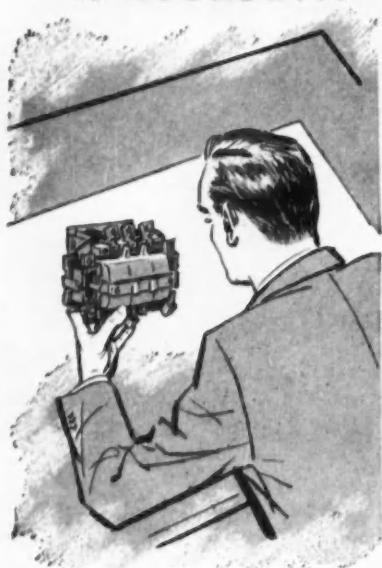
2100 South Laramie Avenue, Chicago 50, Illinois



Irregularly shaped holes are pierced in this stainless steel jet engine part to very close tolerances—automatically.

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NUTS • BOLTS

SPECIAL COLD HEADED PRODUCTS

## **Chevrolet Engines**

(Continued from page 38)

choke of the Blue Flame 125 engine has been stiffened and the vacuum piston increased in diameter.

The Blue Flame 115 engine introduces into the so-called standard power train such features as full-pressure lubrication, aluminum pistons, insert-type connecting rod bearings and a more rigid crankshaft and connecting rods. Displacement is 235 cu in. (same as the 125 engine) with the engine developing 115 hp at 3600 rpm. Compression ratio is 7.5 to 1.

Pistons are of the same lightweight type as used in the 1953 Powerglide engine, but the piston pins have been offset, contributing to quiet operation under all conditions.

Smoother acceleration is provided by a carburetor change to afford a better balance in fuel mixture. This is a double step in the fuel valving into the carburetor power jet which is said to maintain peak efficiency in mixture during changing load conditions.

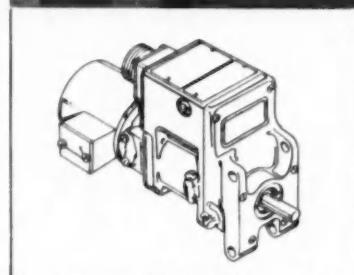
An improved clutch assembly is used for gear shift models. In the previous design the pressure plate was driven from the clutch cover by three lugs. With the re-engineering of the part, the lugs are replaced by three equally spaced, spring steel straps. The straps are riveted to the cover assembly and bolted to the pressure plate. Binding of the slots is now eliminated in the new design. Also in gearshift models changes have been incorporated in the synchromesh transmission. All gears are now shot-peened after hardening and needle bearings have been introduced on the counter gear shaft.

## **BOOKS . . .**

PROCEEDINGS OF THE JOINT INDUSTRY CONFERENCE ON PACKAGING AND PRESERVATION, published by Bureau of Business Research, Michigan State College, East Lansing, Mich. Price, \$1.00. General Motors Corp., in cooperation with Michigan State College, conducted a conference in April, 1953, which brought together over 100 leading packaging men from all corners of the country. They heard papers given by twelve experts (in six pairs of talks, one person in each pair representing the military). Some excellent discussion groups were also held.

ENGINEERING FORMULAS AND TABLES, published by Lefax Publishers, 9th & Sansom Sts., Philadelphia 7, Pa. Price, \$2.75. Civil, mechanical and electrical engineers will find this data book a handy tool. It contains 350 pages of basic formulas, design data, and tables for the three branches of engineering.

## **AIRBORNE ACTUATOR for Navy's Guardian**



The ram air inlet door on this new Grumman sub-hunter is actuated by Airborne's R-412M5 Actuator. Other models and similar Airborne electromechanical units are standard equipment in many service and civilian aircraft. Their wide range of applications is evidence of their great dependability.

If you have a design problem where high power and small space are factors, see our literature in the I.A.S. Aeronautical Engineering Catalog, or write direct to us.

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## **ACCESSORIES CORPORATION**

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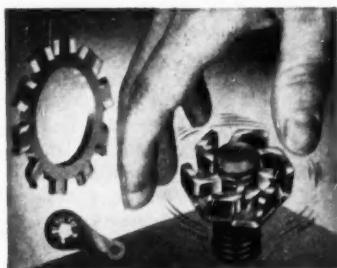
## AMF's DeWalt\* Power Saw

**...Versatile Maintenance Tool  
...A Must for Blocking and Shipping**

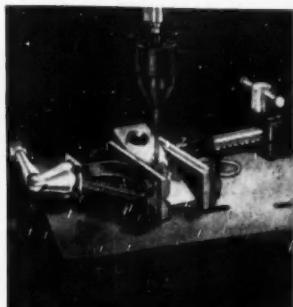
Ruggedly built, designed for maximum safety and continuous operation, the DeWalt Industrial Power Saw is geared to the fast pace of the Automotive Industry.

In the shipping department, it quickly and accurately cuts timbers for blocking or boards for crating. In plant maintenance departments, its extreme versatility helps to speed 1001 jobs. The DeWalt Saw cross-cuts, rips, miters, bevels...even performs special jobs like shaping, drilling and light metal cutting! Easily mounted on casters, it can be rolled right to the job.

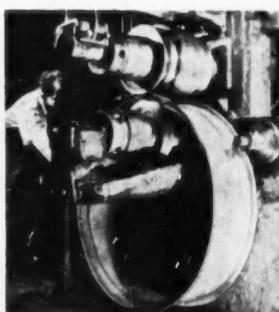
The DeWalt Power Saw is only one of many AMF products which are helping the Automotive Industry and its suppliers to turn out *better products...faster...at lower cost!* Others are illustrated below. For further information on any AMF product write AMERICAN MACHINE & FOUNDRY COMPANY, General Products Group, 511 Fifth Avenue, New York 17, N. Y.



**ASSEMBLY IS SPEEDED** by AMF's Thompson-Bremer *Ever-lock*\* self-locking nuts, tooth-type lock washers and SEMS.



**AMF WAHLSTROM\*** Fully-Automatic Chucks and AMF FLOAT-LOCK Instant-Change Safety Vises speed tool set-up changes.



**MAJOR SUPPLIER** of rims and circular weldments for the Automotive Industry is AMF's Cleveland Welding Company.



**AMF INDUSTRIAL LOWERATOR DISPENSERS** store and position planned quantities of parts in process at efficient working levels.



**products**  
ARE BETTER...*by design*

AMERICAN MACHINE & FOUNDRY COMPANY

## Mercury New Overhead Valve Engine

(Continued from page 41)

A 40-amp, low speed charging generator and a new starter located on the flywheel housing have been designed for faster cranking speeds and quieter starting. A new fuel pump, located in the air stream from the fan,

provides better cooling and minimizes the likelihood of vapor lock in summer weather or warm climates.

Chassis changes include a new frame for greater fatigue strength and the same ball-joint front suspension introduced in the 1952 Lincoln. Other chassis improvements are new front shock absorbers and springs, and modifications to the standard, overdrive, and Merc-O-Matic transmissions for increased life and to more effectively utilize the power of the new engine.

## Cascade System for Storage and Distribution of Argon

(Continued from page 55)

third bank is employed as a standby supply. In this way all previous production interruptions caused by local gas shortages and shut-downs are avoided.

The pressure of the argon is regulated to 25 psi as it leaves the storage system and no further regulation is required at the 85 inert gas-shielded welding stations.

The welding booths are equipped with Ryan-designed gas and water flow timers. These devices automatically control the flows of argon and cooling water during the welding process. Their action is designed to provide a timed gas flow after welding ceases to protect the hot electrode from oxidation.

Because they save substantial amounts of gas, by eliminating guess-work, these timers pay for themselves in sixty days of use. Plant engineers estimate that the new storage facility and the automatic timers will accomplish a saving of more than \$5000 a month in argon gas costs.

## White Engine With Compression Ratios to 10:1

(Continued from page 56)

head thickness. For improved breathing and volumetric efficiency, White engineers have made use of larger valve ports. The pre-machined and pre-lubricated valve guides are of the heavy-duty type.

Riser bores are of increased size in the aluminum intake manifold which is metered for balanced fuel and air flow to distribute the proper charge evenly to all cylinders. The dual exhaust manifolds have increased port outlet areas and are slotted to permit expansion.

Adequate cooling is provided by a new water circulation and cooling system. Coolant is directed through the block and to valve seats where it is metered to give uniform temperatures. The cylinder head is also metered to provide uniform block-to-head temperatures.

An improved thermostat and housing are adjacent to the water pump and an integral part of the pump housing. An air separator is incorporated in the head outlet.

### Helps "Boysize" Trucks Deliver Mansize Load

In the smallest Thrift-T three wheel delivery unit or the largest truck tractor, ROCKFORD CLUTCHES provide power transmission control that helps utilize the maximum capacity of the power plant under the hood. Let ROCKFORD clutch engineers assist your designers to transmit more of your engine's power to the drive wheels.

#### Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.



**ROCKFORD CLUTCH DIVISION** BORG-WARNER

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# CAMCAR COLD-FLOW

IS BOLD WITH BRASS

8 TIMES ACTUAL SIZE



Cold-Flow boldness produces . . . a lower cost . . . superior part . . . for Cinch Mfg. Co., Chicago, Illinois. This modern metal-flow technique adds to this brass part an increased tensile strength and a mirror finish, essential to precise molding.

Cold-Flow is flexible . . . and its boldness steps out in all metals and types of fasteners, frequently incorporating desirable features, at the same time lowering the cost.

If you are buying metal parts in large volume, it will be profitable to investigate Cold-Flow. Camcar Cold-Flow engineers combine practical imagination — skillful tooling — specially built machinery — to far exceed usual limits of metal forming.

Let Camcar engineers examine your fasteners and advise what Cold-Flow can do for you.

**CAMCAR SCREW & MFG. CORP.**  
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	OLD METHOD	COLD-FLOW
MATERIAL REMOVED	88.5%	31.3%
SAVINGS IN MATERIAL COST ALONE.....		83.5%

# SPEEDY Zagar-Broaching

CLOSER HOLE TOLERANCES



ACCURATE  
KEYWAYS

STANDARD  
20" HORIZONTAL.  
ALSO HIGH SPEED  
MODEL

LOW COST

10" VERTICAL

- Singly or in production lines, three Zagar broaching machines broach small and medium size parts with eye-opening speed and accuracy. Profitable uses: keyways in gears, hubs and pulleys; hexes, squares and irregular holes; sizing holes to close tolerances. Simple, fast, easy to learn; costs little to buy, little to operate. May we study your needs?

Write for Engineering Manual "U-12"

**Zagar**

TOOLS FOR INDUSTRY  
and SPECIAL MACHINERY

ZAGAR TOOL, INC.  
24000 LAKELAND BLVD.  
CLEVELAND 23, OHIO

## PAN-AMERICAN RACE

(Continued from page 34)

tions without incident. Rules for the fourth race through 12 states of Mexico specified and emphasized that all cars in the heavy stock plus light sports and stock must be "strictly stock from 1950-1953 models."

For safety reasons, the following modifications were the only alterations permitted on entries: 1—modify suspension and shock-absorbers; 2—Modify the brakes; 3—Remove muffler, but without any alteration to the exhaust manifolds. The tail pipe must end under the rear bumper; 4—Use special tires and rims, but always of the original size; 5—Reinforce the inside of the body for greater protection; 6—Remove rear seats to install an additional fuel tank or to carry spare parts. The additional fuel tank should have one or several vent pipes leading to the outside of the body, at the rear; 7—Install electric fuel pump; 8—Reinforce or improve the hood catch; 9—Install any type of stabilizer.

Race officials also permitted cylinders to be bored up to 0.020 in. in excess of their original dimensions.

Officials are now completing plans to run the race again in 1954 over the same course. They said additional rule changes will be made, based on experience and recommendations received this year.

## BOOKS ...

MANUAL OF MATHEMATICS, published by Lefax Publishers, 9th & Sansom Sts., Philadelphia 7, Pa. Price, \$2.25. This manual is said to be an invaluable aid to engineers, technicians and students in the civil, mechanical and electrical engineering fields. It contains tab-indexed sections on: mathematical reviews, logarithmic tables, natural trigonometric functions, conversion tables, functions of numbers, etc.

SYMPORIUM ON PLASTICS TEST-INC—PRESENT AND FUTURE, published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price, \$2.00. Plastics development is moving ahead so fast that from time to time it is wise to pause and take stock of progress, to review the present state of development and to look ahead to the future. With this in mind, ASTM Committee D-20 on Plastics organized a Symposium on Plastics Testing—Present and Future which was presented at the ASTM annual meeting in June, 1952. The Symposium Committee arranged a group of papers which have been assembled for publication in one handy book.

1903  
1953  
FIRST FIFTY YEARS  
**CLARK**  
EQUIPMENT

# CLARK

One way to make sure that a truck, bus or farm tractor has a reserve of dependability is to equip it with a Clark transmission. This has been true for a quarter-century — and it's well worth thorough consideration when your plans involve power transmission problems. It's good business to work with Clark.

Turn and see reverse side for more about CLARK products

**CLARK EQUIPMENT COMPANY, Buchanan, Michigan**

Other Plants: BATTLE CREEK AND JACKSON, MICHIGAN



*Handle a Three-Ton Load—with One Hand in Your Pocket*

*Use* **CLARK POWRWORKERS!**

CAN'T YOU JUST PICTURE THIS MAN trying to pull this load with an old-fashioned manual hand truck! It's a cinch he wouldn't have a smile on his face—there'd be sweat and strain, because those transmission housings weigh pretty near three tons!

As a matter of fact, his boss is even happier. That POWRWORKER pallet truck has taken the muscle work out of the job, turned a tired worker into the smiling chap you see here. Furthermore, this employee is now doing twice the work he accomplished manually. No labor problem here! And the boss gets more effective use of his storage space, because the compact little POWRWORKER thrives on narrow aisles and low-load floors.

Not to mention the fact that the POWRWORKER is tailor-made for tight budgets. Big-truck benefits at small-truck cost—which means that nobody need deny himself the money-saving advantages of mechanized handling. Pound for pound, dollar for dollar, you can't beat the value in CLARK'S POWRWORKER Line.

Get the facts from your nearby CLARK Dealer—look under "Trucks Industrial," in the Yellow Pages of your phone book; or write for POWRWORKER literature, to Clark Equipment Company, Industrial Truck Division, Battle Creek, Michigan.

1903  
1953  
**CLARK EQUIPMENT**

**CLARK EQUIPMENT**

*Products* — TRANSMISSIONS • AXLE HOUSINGS • TRACTOR UNITS • FORK TRUCKS and TOWING TRACTORS • ROSS CARRIERS POWRWORKER HAND TRUCKS • POWER SHOVELS • ELECTRIC STEEL CASTINGS GEARS and FORGINGS • FRONT and REAR AXLES for TRUCKS and BUSES CLARK EQUIPMENT COMPANY • BUCHANAN, MICHIGAN OTHER PLANTS: BENTON HARBOR • BATTLE CREEK and JACKSON, MICHIGAN

## Industry News

(Continued from page 80)

### Avco Consolidates Two Main Divisions

The consolidation of Lycoming-Spencer and Bridgeport-Lycoming Divs. of Avco Manufacturing Corp. into a single Lycoming Div. has been announced. S. B. Withington will be general manager of the new Lycoming Div. and will continue as vice-president of Avco.

The consolidation move was reportedly effected to simplify Lycoming administration, expand and integrate research, and strengthen its competitive position in the fields of engine and precision parts manufacture, foundry production and other operations. Substantial gas turbine engine research contracts have recently been undertaken by Lycoming and are expected to have important application to helicopter and other power plant requirements.

Lycoming produces large reciprocating engines and major jet engine components in Stratford, Conn. Smaller aircraft engines, tank engines, and precision parts are turned out in Williamsport, Pa.

### GMAC of Canada Offers \$25 Million Debentures

General Motors Acceptance Corp. of Canada recently undertook its first public financing in making a \$25 million, 4 1/4 per cent debenture issue. Offered in Canada at 100, the debentures come due to 1969 and are intended to provide additional working capital for the company. GMACC was incorporated Oct. 15 as a subsidiary of General Motors Acceptance Corp.

### Gar Wood Creates Mattoon Division

Gar Wood Industries has designated its plant at Mattoon, Ill., as a separate division of the company. It will be called the Mattoon Div., and will produce hydraulic components and other subassemblies formerly produced at other Gar Wood plants. The St. Paul Hydraulic Hoist Div. also will be moved to Mattoon.

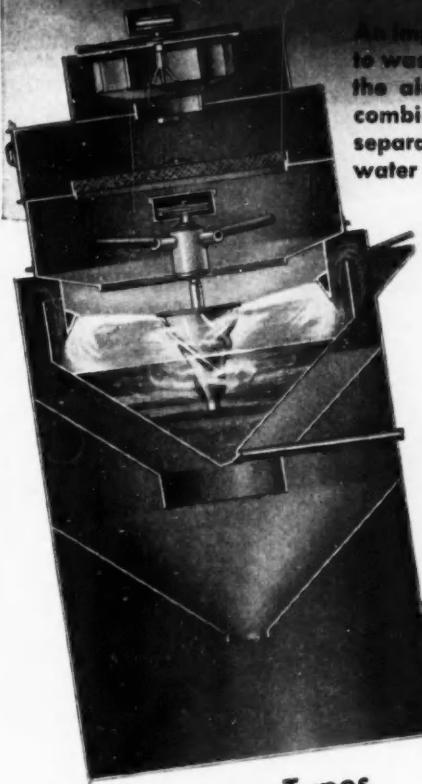
### Clark Mobile Service Unit Stresses Good Maintenance

The Service Div. of Clark Equipment Co. has organized a Mobile Service School for customer personnel on the maintenance and operation of fork

(Turn to page 94, please)

# Now THE NEW Schmieq CENTRI-MERGE Vertical Rotor Type DUST and FUME Eliminators

## FOR THE MOST ECONOMICAL COLLECTION ELIMINATION Efficiency



### Available in Two Types

1. For wet collection and elimination only.
2. For primary dry and secondary wet collection and elimination, with built-in dry type pre-cleaner.

Capacities from 500 to 50,000 C.F.M.

THE best AIR PURGE  
is  
CENTRI-MERGE

**Schmieq INDUSTRIES INC.**  
*Engineers & Manufacturers*

Pioneer Manufacturer of  
Wet Type Dust and Fume Elimination Equipment  
P. O. BOX 4701 • DETROIT 34, MICHIGAN

Write or phone for your copy of Bulletin VU 8-53, describing the superior operating characteristics and maintenance advantages of the new Vertical Rotor Units. Then consult with Schmieq engineers to plan a Centri-Merge installation for maximum dust and fume collection and elimination efficiency in your plant.

## Industry News

(Continued from page 93)

trucks, towing tractors, Ross straddle carriers and related materials handling equipment. The dealer organization is cooperating in the project to offer advanced training in the customer's "back yard."

Only employees already familiar with general automotive maintenance and repair techniques are eligible for the course. The course subject matter concentrates on recent develop-

ments in materials handling equipment.

The Service School is currently touring the country and holding sessions for the industrial community in each dealer's area. Special emphasis is placed on training mechanics and service personnel to think in terms of preventive maintenance.

School equipment, transported in a special over-the-road tractor-trailer unit accompanied by the instructor and an assistant, includes working cutaway models of assemblies, movies, slides, printed study material and a

public address system. Class sessions are limited to 60 students, and the school remains in a particular location as long as the demand requires.

### British Trucking Industry Casts Off Nationalization

The final stage in the break-up of the British nationalized road haulage scheme has been entered with the sale of 3150 trucks and 298 transport units. There will be second and third sales in 1954 to cover 10,000 vehicles in about 1600 units.

Out of the 36,000 vehicles operated by the national transport body, about 3500 will be retained; these are mostly specialized vehicles for long-distance haulage. There will be fourth and fifth lists to dispose of the remaining 20,000 vehicles.

There is much speculation as to the success of these sales. Some maintain that next year the Disposal Board will find itself with 20,000 unsold vehicles on its hands which will have to be sold at bargain prices. Up to the present time it has been impossible to estimate just how much the nationalization scheme has cost the nation.

### GM of Canada Forms New Bus Division

General Motors Products of Canada, Ltd., has announced the formation of a new division to sell, distribute, and service passenger coaches of GM manufacture. The new division will cover all types of gasoline and Diesel coaches.

### Lockheed Sets Up New Missile Div.

Lockheed Aircraft Corp. has announced the establishment of a separate new division to deal exclusively in the design, development, and production of pilotless aircraft and missiles. The new organization will be known as the Missile Systems Div. and its initial headquarters will be in Lockheed's Burbank, Calif., plant.

### Anti-Smog Material Employed in Tires

Use of a new material in tires to protect them from being attacked by smog, chemical fumes, and smoke was recently disclosed by Firestone Tire & Rubber Co. The new material is mixed with rubber and other chemicals and, after the tire is put into use, reportedly continually provides a film-like coating over the sidewall and other parts of the tire.

(Turn to page 96, please)

6 to 8-VOLT or 12-VOLT—IF IT'S AN AUTO LAMP—TUNG-SOL MAKES IT

TUNG-SOL makes All-Glass Sealed Beam Lamps, Miniature Lamps, Signal Flashers, Picture Tubes, Radio, TV and Special Purpose Electron Tubes and Semiconductor Products.

TUNG-SOL ELECTRIC INC.  
Newark 4, N. J.

Sales Offices: Atlanta, Chicago, Culver City (Los Angeles), Dallas, Denver, Detroit, Newark, Philadelphia, Seattle.

A small illustration of a TUNG-SOL signal flasher is shown.

**TUNG-SOL<sup>®</sup>**  
**AUTO LAMPS**  
**and SIGNAL FLASHERS**

A box labeled "TUNG-SOL AUTO LAMP BULBS" is shown.

**95% of the  
production machinery  
at Nash Motors'  
El Segundo, California Plant**

*is lubricated  
with a  
single grease...*

RECENTLY, the El Segundo plant of Nash Motors replaced the 12 to 15 greases they were using with a single multi-purpose grease . . . Shell Alvania.

Here, as in many other plants, Shell Alvania Grease has made a vast difference. Immediate savings were made. The new lubricant cut the cost of handling many special greases. It reduced bookkeeping, inventory and overhead . . . offered more favorable bulk purchasing economies. In addition, Alvania reduced application equipment by 75%.

The real difference was in performance. Bearing failures and breakdown are now at an all-time low. Repair bills in one department were running hundreds of dollars before the change in lubricants. Now, with Shell Alvania Grease, this same department reports that repairs are practically non-existent.

Shell Alvania Grease can be the answer to a more efficient lubricating program in your plant. For further information write to Industrial Lubricants, Shell Oil Company, 50 West 50th St., New York 20, N.Y.—or 100 Bush St., San Francisco 6, California.

## **SHELL ALVANIA GREASE**

*The True Multi-Purpose Industrial Grease*

**SHELL ALVANIA GREASE**

**Here are some of the advantages of Shell Alvania Grease:**

1. Shell Alvania Grease flows freely in cold temperatures, yet will not run out of bearings under excessive heat.
2. Ideal for wet, humid applications . . . it resists water emulsification.
3. Shell Alvania Grease has extremely high oxidation stability.
4. You'll find that Shell Alvania Grease extends time between greasings . . . a substantial saving in labor and grease.
5. Simple inventory . . . just the one grease to stock and apply.





**Use Sturdy  
CLEVELAND CONTAINERS  
for Packaging  
IMPORTANT PARTS!**

Our Metal End Telescope Cans and Curled and Disc End Containers are ideal for welding rods . . . cutting tools, such as drills and reamers . . . also gauges and other instruments.

They save time in packing many kinds and quantities of items ready for assembly, even to small items such as bearings and other parts requiring frequent replacement.

★ ★ ★

**Excellent, too, for long-time storage and shipping.**

★ ★ ★

Our V. P. I. (Vapor Phase Inhibitor) and other new type liners are available, affording years of protection from rust and corrosion without the need of coating products with oil, grease or wax.

Ask about Cleveland Containers with special liners.

Our wide experience  
is at your command.

For the best . . . Call CLEVELAND!

**The CLEVELAND CONTAINER Co.**

6201 BARBERTON AVE. CLEVELAND 3, OHIO

- All-Fibre Cans • Combination Metal and Paper Cans
- Spirally Wound Tubes and Cores for all Purposes

PLANTS AND SALES OFFICES: Cleveland, Chicago, Detroit, Memphis, Plymouth, Wis., Ogdensburg, N.Y., Jamesburg, N.J. • ABRASIVE DIVISION at Cleveland. SALES OFFICES: Grand Central Terminal Bldg., New York City; Washington Gas Light Bldg., Washington, D.C.; West Hartford, Conn.; Rochester, N.Y.

Cleveland Container Canada, Ltd. PLANTS AND SALES OFFICES: Toronto and Prescott, Ont. • SALES OFFICE: Montreal.



## Industry News

(Continued from page 94)

### Electro-Motive Introduces Ten New Diesel Locomotives

Ten new types of Diesel locomotives were recently announced by Electro-Motive Div. of General Motors Corp. Deliveries are expected to begin in January, 1954.

Notable improvements in the line include an increase from 6000 to 7000 hp in the four-unit freight locomotive; new traction motors; a sealed gear case with a newly developed stable lubricant; simplified electrical control apparatus; and new wheel slip control and automatic sanding equipment. New engine cooling capacity and new brake rigging stabilizer are other features.

### Work on Chinese Factory for Vehicles to Begin

The main work on China's first vehicle factory at Mukden is expected to start early in 1954.

Construction of the boiler-room, wood, and non-ferrous metal workshops is said to be finished now. When completed, the plant will have five principal shops with a total floor area of some two million sq ft.

Russia is understood to be supplying most of the machinery, jigs, molds, dies and drawings. The first automobiles and trucks are expected to be replicas of Soviet models.

The Chinese also claim to have produced synthetic rubber from a local variety of dandelion. Tires made from this material are said to be undergoing tests on Peking buses.

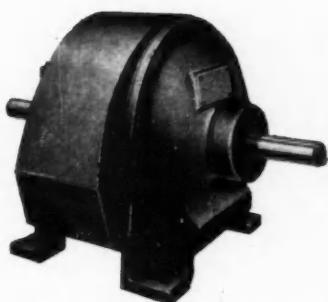
### Fruehauf Plans Sale Of 20-Year Debentures

Fruehauf Trailer Co. plans to raise \$10 million through sale of convertible subordinated debentures. Proceeds will be used to retire short term indebtedness and to increase working capital. The debentures would be due Dec. 1, 1973.

### IHC Announces Two Models for Use in Rough Terrain

The Motor Truck Div. of International Harvester Co. has announced two new four-wheel-drive models specially designed for use in rough terrain. The two models are the In-

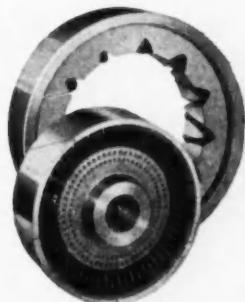
(Turn to page 98, please)



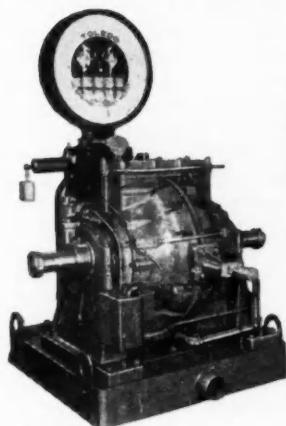
AIR COOLED COUPLINGS



AJUSTO-SPEDÉ MOTORS



AIR COOLED BRAKES



ABSORPTION DYNAMOMETERS

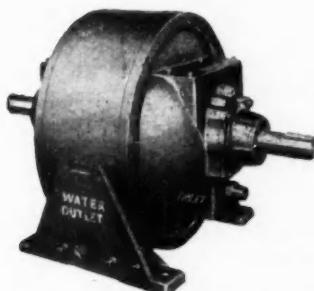
EATON

# DYNAMIC<sup>®</sup>

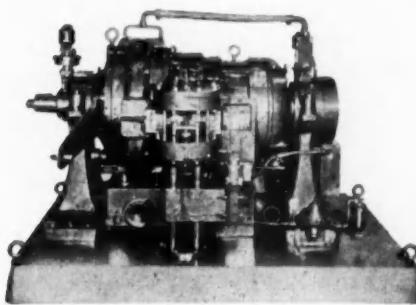
## EDDY-CURRENT ROTATING EQUIPMENT



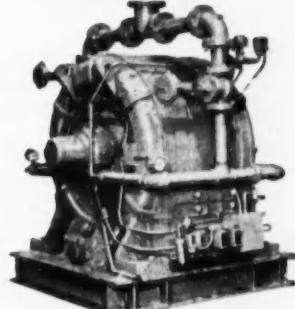
PRESS DRIVES



LIQUID COOLED COUPLINGS



UNIVERSAL DYNAMOMETERS



LIQUID COOLED BRAKES



Write for your copy of Bulletin GB-1 which describes and illustrates the basic Dynamatic units.



# CORPORATION

Subsidiary of EATON MANUFACTURING COMPANY, Cleveland, Ohio

KENOSHA • WISCONSIN

## Industry News

(Continued from page 96)

ternational R-140-4x4, with GVW of 11,000 lb, in 130 or 142-in. wheelbase, and the R-160-4x4, with GVW rating of 15,000 lb in 154 and 172-in. wheelbase.

Front and rear axles of both new models are single-reduction hypoid bevel gear type. Transfer case in both has 1 to 1 to 1.87 gear ratios pro-

viding, in combination with the four-speed transmissions, eight forward and two reverse speeds. The transfer case is designed for the mounting of a full-torque power-take-off at rear of input shaft.

Model R-140-4x4 is powered by the 100-hp International Silver Diamond 220 engine, with a maximum torque of 173.5 at 2000 rpm. Standard transmission is a sliding gear selective type with four speeds forward and one reverse.

Model R-160-4x4 is powered by the 108-hp International Silver Diamond

240 engine. The SD-240 delivers 108 hp, with maximum torque of 192 at 1400 rpm. Standard transmission is a sliding gear selective type with four speeds forward and one reverse.

### Aircraft Manufacturing Sought by Michigan

Plans have been formulated by The Committee on Aircraft Manufacturing of The Michigan Economic Development Commission to attract aviation companies to the state. Peter Altman, vice-president of Continental Motors Corp. and private engineering consultant, is serving as chairman of the group.

Helicopter manufacturers appeared to be the best prospects, and Doman, Kaman, Piasecki, and Sikorsky have already been approached on the subject. All of the four expressed interest in the proposal but are unable for one reason or another to take immediate action. The committee is still working on the project and hopes to have tangible results to report soon.

### Alcoa Forged Wheels Added to Budd Line

In order to help fill a growing demand in the trucking industry, Budd Co. has added to its line of steel wheels an aluminum forged disc wheel.

The wheel is forged for Budd at the Cleveland Works of Aluminum Co. of America on a 3000-ton press. Budd then has the forging machined to close tolerances.

### Hamilton Standard Opens Laboratory Facilities

New laboratory facilities have recently been completed at Hamilton Standard, division of United Aircraft Corp., Windsor Locks, Conn. They bring to 82,000 sq ft the total floor area now used for development work.

The new facilities include: a test building of about 60,000 sq ft floor area containing two propeller test cells, a test cell for jet engines, a pneumatics laboratory, a fuel control laboratory and a propeller balancing room, and a separate building in which is housed a combustion laboratory.

The new structures complement an area within the factory proper, adjacent to the new test building, in which are situated an hydraulics and mechanical testing laboratory, a vibration laboratory and an electronics laboratory.

(Turn to page 158, please)



# JOHNSON

## Tappets

"fill the exacting requirements  
of today's engines"

Higher horsepower and higher compression put heavier loads on the tappets. Johnson quality assures you the performance you want from these vital engine parts.



"Tappets are our business"

**JOHNSON Jp PRODUCTS**  
INC.  
MUSKEGON, MICHIGAN

## MAINTENANCE

(Case History 4820)  
Black & Decker  
Drill, 16 years  
old...still going  
strong.

## CONSTRUCTION

(Case History 7338)  
Copper roof  
batting installed  
20 TIMES FASTER  
than old methods  
with B&D Power.

## PRODUCTION

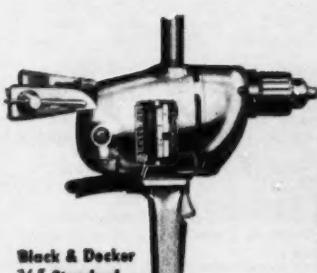
(Case History 10691)

Black & Decker  
Drill speeds up  
production and  
operation 100%.

Hall-Neal,  
Indianapolis, Ind.

Hall-Neal manufactures furnaces, installs them and air-conditioning equipment. Photo shows  $\frac{1}{4}$ " B&D Drill used to drill hole in 22 gauge steel. Also used for general maintenance. The use of the drill has resulted in 100% speed up in operation and production. Company also uses B&D Screwdriver, Heavy Duty Grinder. Some on job 8 hours a day,  $5\frac{1}{2}$  days a week for 10 years.

*Jim—Note this proof of  
long trouble-free service*



Black & Decker  
1/2" Standard  
Electric Drill



Black & Decker  
1/4" Heavy-Duty  
HOLGUN® Drill

## Black & Decker Cases for Comment

In thousands of  
cases, industry finds  
Black & Decker Power  
gives production  
a big boost

Here's power to drive drills (and  
saws, grinders, hammers, screw-  
drivers) ... produce more per  
machine ... per man-hour.

Here's power *custom-built* for  
the job. Power built into every  
B&D Portable Electric Tool be-  
cause every B&D Tool is driven  
by a B&D-built motor. And every  
B&D Tool is built to the latest  
design with husky housings,  
precision parts. Year in, year out  
you can depend on B&D Tools  
to do the job faster ... saving  
time, trouble, money, and man-  
power.

Don't just take our word for it. Ask around industry. Ask  
production specialists. Ask time  
and motion experts. Then try  
Black & Decker Drills ... Black  
& Decker Power. See your B&D Distributor for  
demonstration. And write today for free, detailed  
catalog. Address: THE BLACK & DECKER MFG. CO.,  
606 Pennsylvania Ave., Towson 4, Maryland.

\* LEADING DISTRIBUTORS EVERYWHERE SELL

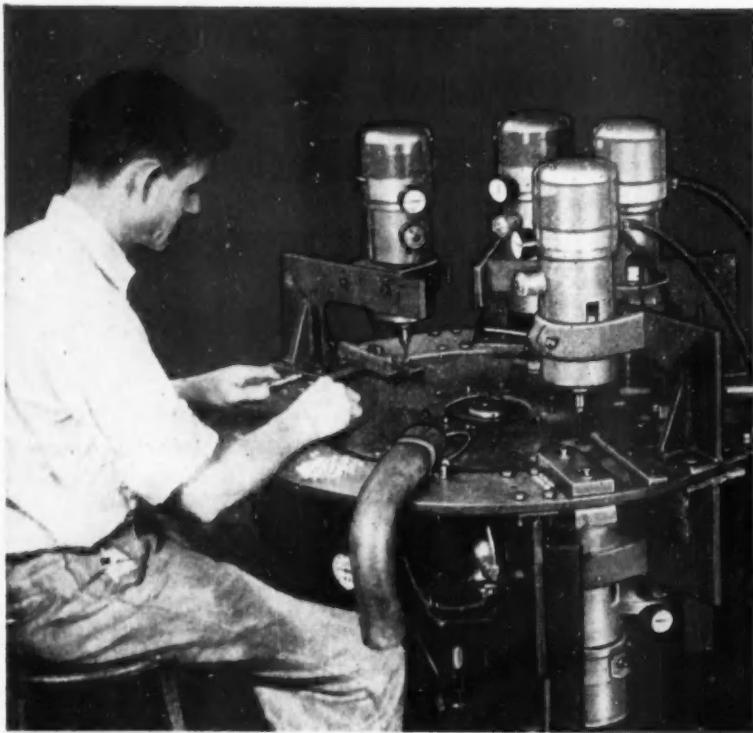
**Black & Decker**  
PORTABLE  
ELECTRIC TOOLS



\* Trade Mark Reg. U. S. Pat. Off.

# Why buy expensive tooling

...when Dumore Drill Heads will mass produce  
small holes at a fraction of the cost!



This setup consists of six Dumores — mounted four above and two below an indexing table. It solved the problem of production drilling and chamfering two holes (.038" and .076") in a tiny (.109") brass part.

NOW, with Dumore Automatic Drill Heads, you can put small hole drilling on a profitable mass production basis without making a major investment!

Low-cost Dumore Automatic Heads mount in any position...are easily set up to handle practically every small hole drilling operation. They make it simple to drill multiple holes in a single workpiece in only one operation...are equally efficient as components of multiple station high-production machines.

Why? Because these compact, 17½-lb. precision tools are self-contained...require no expensive air or hydraulic lines...have built-in automatic controls.

However, outstanding productivity and flexibility are not the only advantages Dumore Drill Heads offer. They also give you substantial benefits that effect conservation of skilled labor...big reductions in drill breakage. So get all the facts now. Contact your Industrial Distributor or write:



**DUMORE PRECISION TOOLS**

The Dumore Company  
1339 Seventeenth Street • Racine, Wisconsin

## CALENDAR

### OF COMING SHOWS AND MEETINGS

Material Handling Institute, annual meeting, Hotel Statler, New York, N. Y. .... Dec. 16-18

#### 1954

Truck-Trailer Manufacturers Association, annual meeting, Boca Raton, Fla. .... Jan. 11-13

SAE Annual Meeting, Sheraton-Cadillac Hotel and Hotel Statler, Detroit, Mich. .... Jan. 11-15

National Motor Boat Show, Bronx, N. Y. .... Jan. 15-23

General Motors Motorama, Waldorf Hotel, New York, N. Y. .... Jan. 21-26

World Motor Sports Show, New York, N. Y. .... Jan. 23-31

Plant Maintenance & Engineering Show, Chicago, Ill. .... Jan. 25-28

Society of Plastic Engineers, 10th annual technical conference, Royal York Hotel, Toronto, Ont. .... Jan. 27-29

Chicago National Boat Show, Chicago, Ill. .... Feb. 5-14

International Motor Sports Show, New York, N. Y. .... Feb. 6-14

National Transport Vehicle Show and Fleet Maintenance Exposition, New York, N. Y. .... Feb. 17-19

American Society for Testing Materials, spring meeting, Shoreham Hotel, Wash., D. C. .... March 1-5

SAE National Passenger Car, Body, and Materials Meeting, Hotel Statler, Detroit, Mich. .... March 2-4

Pacific Automotive Show, Seattle, Wash. .... March 4-7

Geneva Automobile & Truck Show, Geneva, Switzerland .... Mar. 11-21

SAE National Aeronautic Meeting, Statler Hotel, New York, N. Y. .... April 12-15

International Motor Show, Turin, Italy .... April 21-May 2

ASTE Industrial Exposition, Philadelphia, Pa. .... April 26-30

American Welding Society, spring technical meeting, Hotel Statler, Buffalo, N. Y. .... May 4-7

International Aviation Trade Show, New York, N. Y. .... May 5-7

Annual Foundry Congress and Show, Cleveland, Ohio .... May 8-14

Basic Materials Exposition, Chicago, Ill. .... May 17-20

Canadian International Trade Fair, Toronto, Canada .... May 31-June 11

SAE Summer Meeting, Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J. .... June 6-11

Society of the Plastics Industry, Sixth National Exposition, Cleveland, O. .... June 7-11

*...take your choice*



WARD LAFRANCE



White FREIGHTLINER

# FULLER ROADRANGER®

Peterbilt

Corbitt

White

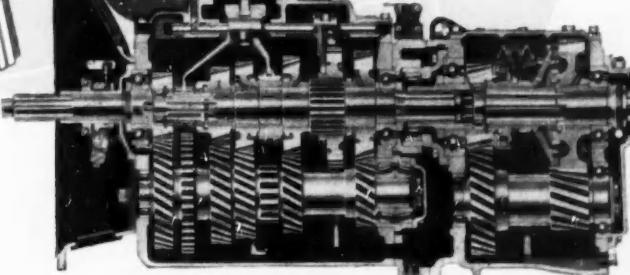
HENDRICKSON

DIAMOND T



FEW

Autocar



10-Speed ROAD RANGER



Leading fleets have proved the Fuller ROADRANGER in gruelling service . . . and more and more fleets are specifying this 10-speed, one-lever transmission. Here's why:

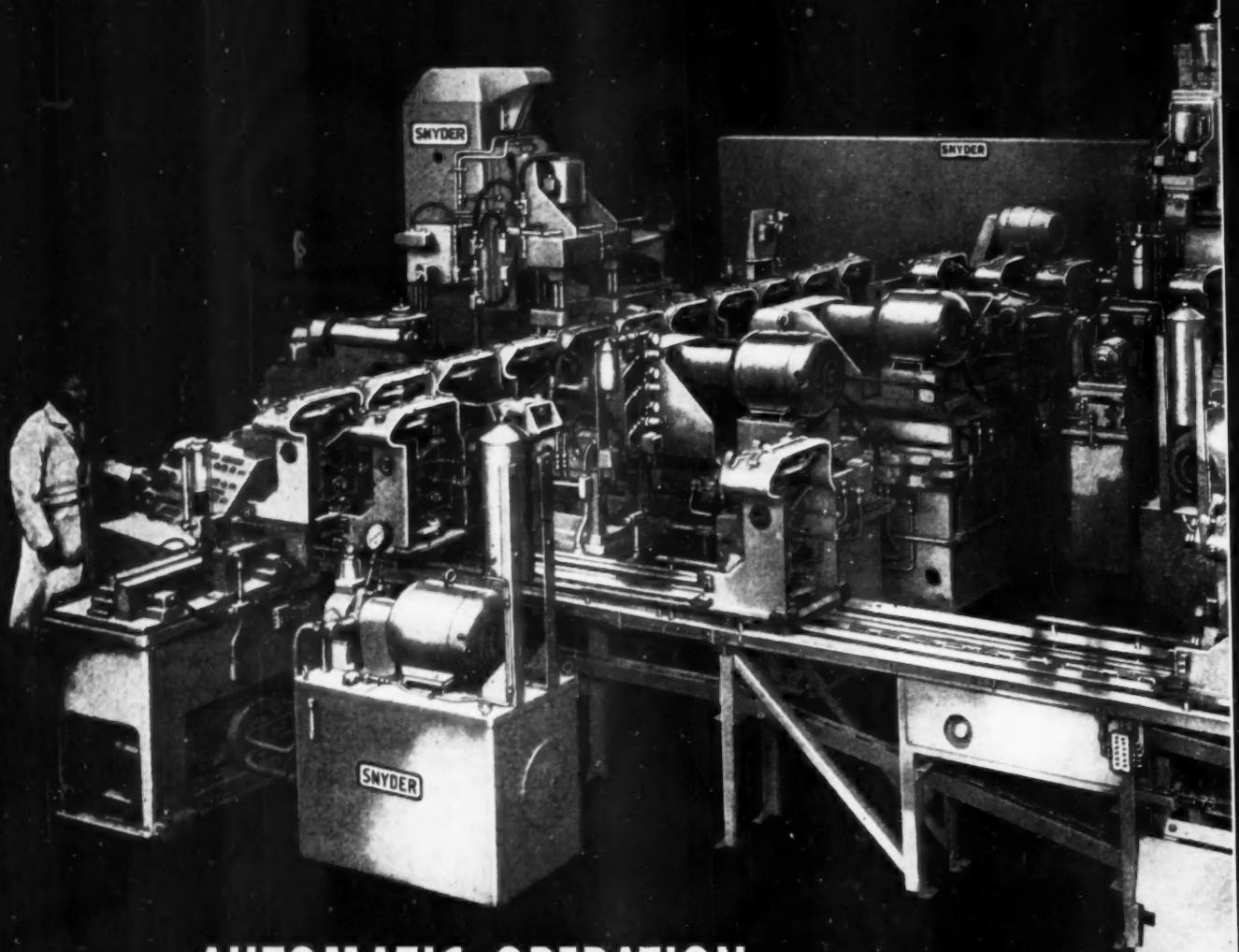
1. No gear splitting—10 selective gear ratios, evenly and progressively spaced.
2. Easier, quicker shifts—28% steps—one shift lever controls all 10 forward speeds.
3. Higher average road speed—engine operates in peak hp range with greater fuel economy.
4. Less driver fatigue—*i. e.* less shifting.
5. Range shifts pre-selected—automatic and synchronized.
6. More compact than other 10-speeds.
7. More cargo on payload axle.

Available in Models R-95-C and R-950-C (overdrive)

FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT BRANCH (SALES & SERVICE—BOTH DIVISIONS), 641 E. 10th Street, Oakland 6, Calif.

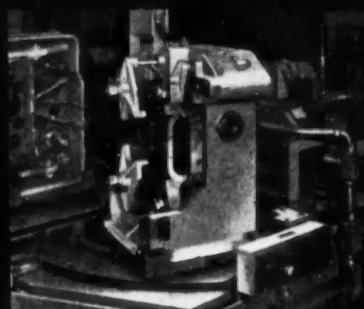
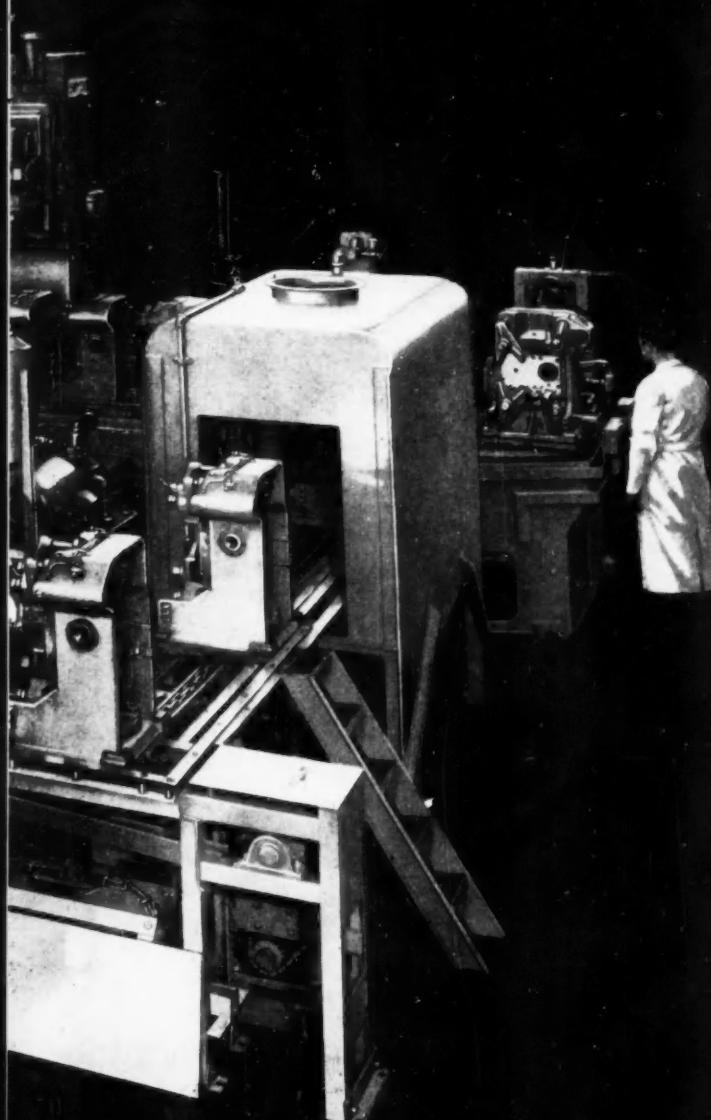
# SNYDER MACHINES CONTROL COSTS



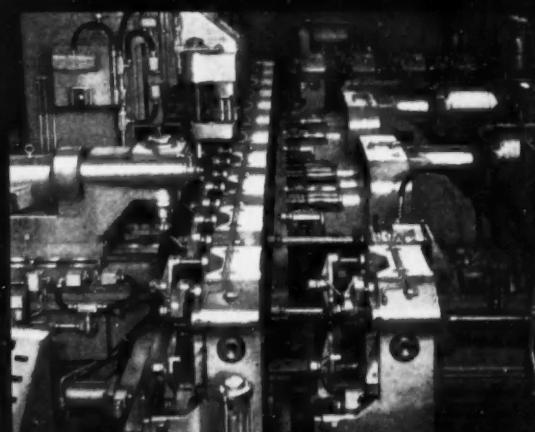
## AUTOMATIC OPERATION

MILLS, DRILLS, TAPS, BORES, COUNTERBORES,  
COUNTERSINKS FRONT COVERS FOR AUTOMOTIVE  
ENGINES • AUTOMATIC INDEXING, LOCATING, CLAMPING,  
AND RELEASING • AUTOMATIC TRANSFER THROUGH  
TWO-STAGE, CONTINUOUS WORK CYCLE • AUTOMATIC  
CONTROLS • AUTOMATIC SAFETY INTERLOCKING SYSTEM  
• AUTOMATIC LUBRICATION • AUTOMATIC CLEANING  
AND CHIP REMOVAL • SKILLED OPERATORS NOT NEEDED

**18 STATION AUTOMATIC TRANSFER**  
**180 FRONT COVERS AN HOUR AT 100% EFFICIENCY**



At Station 18 the fixture is rotated 90°, air wrenches unclamp the part so that it is easily removed. The fixture returns to Station 18, engages the return conveyor, is automatically blown clean and returned to the loading station.



Fixtures leaving Section 1 (above) move at right angle so that the other faces and top of the part are exposed to tools. The part enters the work cycle with three ground faces, leaves it ready for assembly.

# SNYDER

TOOL & ENGINEERING COMPANY

3400  
E. LAFAYETTE

DETROIT 7,  
MICHIGAN

*28 Years of Successful Cooperation with Leading American Industries*

# ON OUR WASHINGTON WIRE



Government rate of new car buying for civilian agencies is down. General Services Administration, which contracts for all

federal automobiles except those the military uses, bought only 201 new cars between July 1 and Oct. 15. This points to an annual rate

of fewer than 800 cars, compared with 2482 bought by GSA in the year ended June 30.

State highway officials are urging a change in handling costs of improving the interstate system of roads. They recommend that the federal portion of costs be raised to 75 per cent, while the states provide the other 25 per cent. Costs are now shared on a 50-50 basis.

Government incentives, including a guaranteed market for titanium producers, are being urged by the Air Force, which says it can obtain only a small percentage of the amount it needs.

Better prospect for a federal census of manufacturers next year brings hope to industry market analysts. Census Bureau had planned to conduct its regular censuses of manufactures and transportation this year, but an economy-minded Congress withheld the necessary funds.

Federal spending for current fiscal 1953-54 is officially estimated at present at \$72 billion. Unconfirmed talk is that the White House insists that January budget requests be cut to \$6 billion less than this figure.

Business Defense Services Administration stated that some aluminum producers are having their troubles in meeting stockpile obligations for specified grades without shorting civilian customers. The Government may come to the aid of the industry by concentrating more on filling stockpile needs for lower grade metal until new plants get into production and start turning out quality metal to meet high purity requirements.

Proved in the laboratory and in the field, Donaldson Air Cleaners meet all the rigid requirements of air compressor applications. Practically all dust, including elusive "extra fines" is removed to reduce wear on compressor parts; and the oil-trapping upper condensing element reduces oil loss from cyclical "blow back" to a minimum.

Donaldson air compressor Air Cleaners are used extensively by leading manufacturers on units with a wide range of capacities. Write for specifications.

**DONALDSON CO., INC.**

666 Pelham Blvd., St. Paul 4, Minn.  
DONALDSON CO. (Canada) LTD., Chatham, Ontario  
GRINNELL DIVISION: Grinnell, Iowa

# Donaldson AIR CLEANERS



## **KEYBOARD FOR POWER!**

Turning at hurricane speed, the camshaft of an engine plays a powerful tune. Its finger-like cams spin in sequence, deftly controlling the explosive diet of each plunging piston. But to perform its important task, a camshaft must excel in many ways . . . and therein lies a story of castings. Quite some years ago, Campbell, Wyant and Cannon realized the wealth of benefits in store for engine user and engine manufacturer if a camshaft could be cast successfully. So CWC put engineering and research to work . . . developed special electric furnace alloys far superior to any previously used materials.

Since that time, CWC has delivered over 40 million cast camshafts . . . saved engine builders well over 50 million dollars. In addition to being produced at lower cost, these camshafts are heat treated to resist corrosion and wear for the life of the engine. They need little machining, are easier to machine and actually extend design possibilities of the engine.

It will pay to consider castings for your product. Many others have found the most important step is to contact CWC.

**CAMPBELL, WYANT AND CANNON  
FOUNDRY COMPANY**

Muskegon, Michigan

GRAY IRON, ALLOY IRON AND STEEL CASTINGS

# "CHICAGO"

precision valve gear parts

•STEEL •CAST IRON •STEEL and IRON

Hydraulic Tappets • Hydraulic Units for Push Rods and Rocker Arms • Mechanical Tappets • Push Rods • Self Locking and Standard Thread Adjusting Screws • Adjusting Screw and Pad Assemblies • Valve Spring Retainers • Split Valve Locks



Connecting Rod Bolts.....	Hydraulic Cylinder Pistons
Cylinder Head Studs.....	Cylinder Head Cap Screws
Main Bearing Studs.....	Main Bearing Cap Screws
Flywheel to Crankshaft Screws.....	Diesel Energy Cells
Wheel Bolts and Studs.....	Differential Carrier Screws
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SCREW COMPANY  
2801 WASHINGTON BLVD.  
BELLWOOD, ILLINOIS  
Established 1872

# SHORTIES

An automobile requires around  $1\frac{1}{4}$  tons of steel; there may be around 160 separate and distinct varieties of steel in the car; and the steel is in over 1000 combinations of form, chemical composition, size and quality.

Over 3.2 million passenger cars were made in the U.S. in the first half of 1953, or one every  $4\frac{3}{4}$  sec.

At the present monthly rate, steel companies will pay their employees about \$3.3 billion this year, or enough to cover the 1954 budget of six of the nine departments of the Government represented by cabinet officers.

During an average day in 1952, the steel industry used enough electricity to supply about 13.5 million homes and enough water for a city nearly nine times the size of New York.

More than 80 per cent of the Government's revenues now are derived from income taxes.

A new experimental turbojet engine now in operation is more powerful than five locomotives. It breathes a ton of air a minute.

In U.S. aircraft plants alone, pay-checks made out to women total nearly \$11 million every week.

For every dollar of a typical airframe contract, the average U.S. plane manufacturer subcontracts 51 cents to outside manufacturers.

The wings of a modern jet bomber could support a stack of Cadillac automobiles as high as the Washington Monument.

**The range of their application widens!**

# **MORAINE** friction materials

Engineers and designers continue to find new ways to make Moraine friction materials pay off . . . in better performance at lower cost.

Moraine friction materials first made a name for themselves in automatic transmissions such as Powerglide, Dynaflow and Hydra-Matic. They are equally successful in special military vehicles and equipment, household appliances, and automatic truck transmissions.

Characteristics of Moraine friction materials include their ability to resist heat over a wide temperature range and wear over long periods of use. The uniform dispersion of non-metallic materials through the semi-metallic or metallic matrix makes this possible. For added strength and wider application, the materials are, in some cases, bonded to a steel support.

With our experience and proved ability with friction materials, there may be ways Moraine friction materials can help your product.



**moraine  
products**

DIVISION OF GENERAL MOTORS CORPORATION, DAYTON, OHIO

# New Products

(Continued from page 72)

## Motor Oil

Recently announced is a motor oil, known as Super B, that is said to have been developed expressly for high-compression passenger car engines. It is said to handle effectively

the problems of hydraulic valve lifter sticking and deposit-induced combustion chamber knock.

The refiner claims quick starting and instantaneous pumpability at temperatures down to 20 F. Due to its extremely high viscosity index, full-bodied protection is said to be assured at hottest engine operating temperatures. It is reportedly fully detergent-dispersant.

The oil allegedly reduces low-temperature sludge and varnish resulting from stop and go driving. It combats corrosive wear by neutralizing the

harmful acids formed by combustion, according to the refiner. *Kendall Refining Co.*

Circle 34 on page 73 for more data

## Mechanical Shaft Seal

Recently introduced is a double-face cartridge seal that is said to be designed to meet the requirements of higher pressures, temperatures, and rpm. The seal is one unit with all parts contained in a compact housing cup.

The stator rings are reportedly designed to insure close hydraulic balance, even when pressure is applied from either side of the seal. Cavity between the two stators contains a lubricant that prevents seal from overheating if run dry.

The O ring, it is claimed, "floats" the sealing faces, protecting them from the shock and vibration that ordinarily cause leakage.

Rotor has two sealing faces lapped flat and parallel. It is available with either pressed-in or flange mounting. *Cartruseal Corp.*

Circle 35 on page 73 for more data

## Twin Air Horns

Now on the market are twin air horns electrically actuated from a solenoid air valve. Called the Dual-H horns, one 18 in. and the other 23 in. in length, they are made of chrome-plated brass and are designed to be mounted on opposite sides of a car hood. *Haynes Sales Corp.*

Circle 36 on page 73 for more data

## Truck Tire

Now on the market is a highway truck tire which has variable grooves and ribs that are said to give maximum stability and wear. It comes in sizes ranging from 6.00:16 to 11.00:24. *Fisk Div., U. S. Rubber Co.*

Circle 37 on page 73 for more data

## Cell Puller

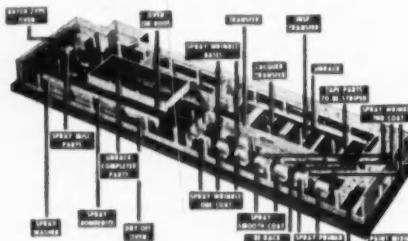
Now available is a cell puller for removing cells from batteries for examination or repair. The tool, generally used in sets of two, consists of a U-shaped steel loop brazed to a hexagonal steel nut with specially-cut threads tapering from bottom to top. The nuts are screwed down over the lead posts, a piece of wood is placed in the loops and the cell is pulled from the battery by a chain or rope. The same tool is also used with hold-down clips for removing the elements from the jar. *Gould-National Batteries, Inc.*

Circle 38 on page 73 for more data

(Turn to page 111, please)



## Custom Made . . . from START to FINISH Complete Paint Finishing Systems Designed and Engineered for Your Specific Needs by P-D



Peters-Dalton has a long established reputation for properly designing and skillfully engineering the units of finishing systems and fitting them into high-production and economical operations. P-D leadership in the design and manufacture of highly specialized modern paint finishing systems is the result of 25 years experience in a wide range of industries. P-D's recognized facilities and engineering techniques can help solve the problems offered by installations in new or expanding plants. We'll gladly tell you more if you . . . Write, Wire or Phone.

**METAL PREPARATION** — Operating on a conveyor, metal parts washers are designed by Peters-Dalton to remove all kinds and amounts of dirt sticking to parts. We are a recognized authority on washers that both clean and deposit a bonding or rust-proofing film used before a paint operation.

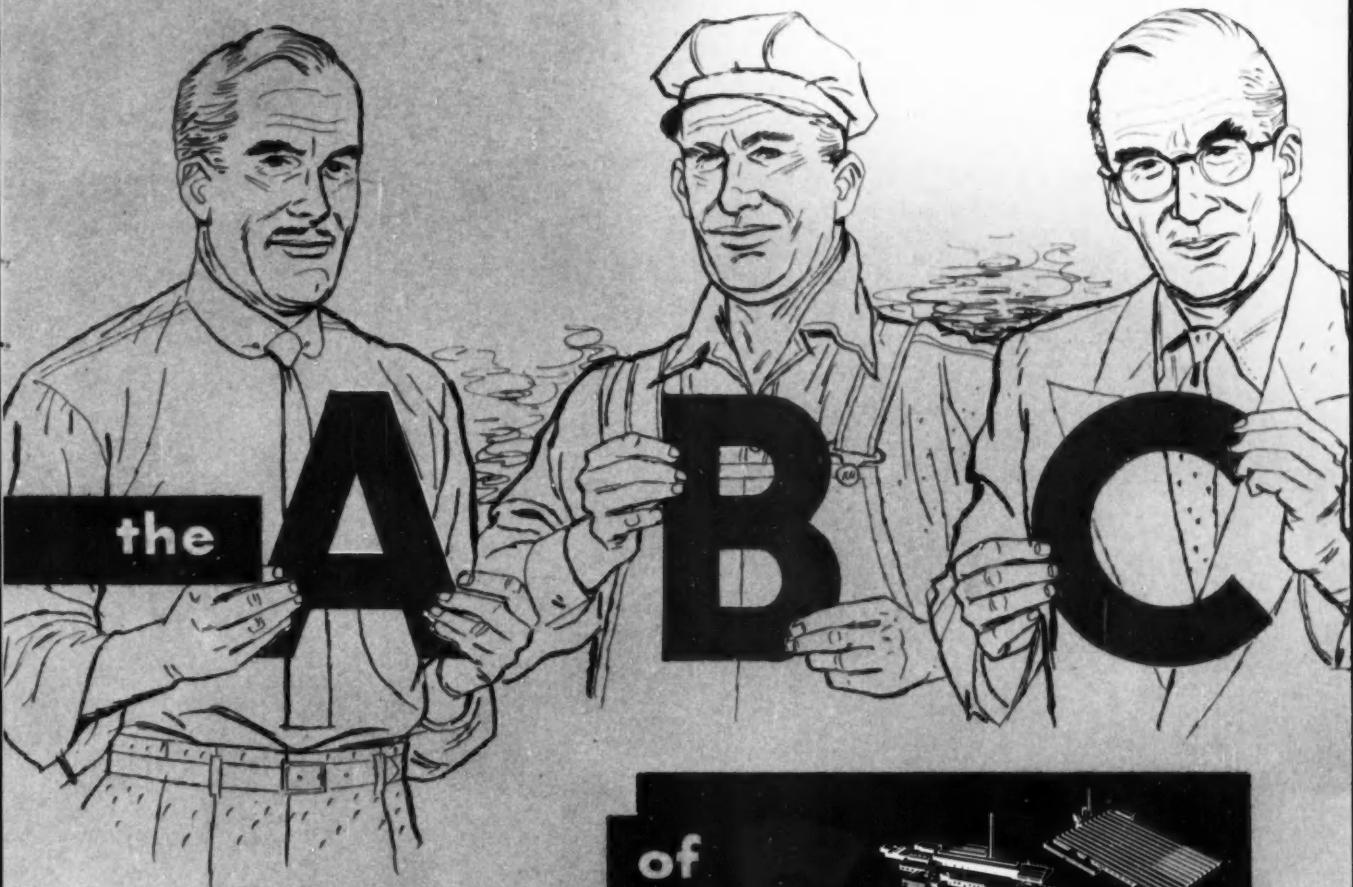
**SPRAY PAINTING** — In addition to reducing fire hazards, we emphasize that spray booths should be designed around the part and output volume to effectively eliminate paint overspray.

**BAKING and DRYING** — Peters-Dalton designs and manufactures all types and sizes of ovens, including core, dehydration, curing, and special purpose units for direct or indirect gas or oil firing.



**Peters-Dalton INC.**

17930 Ryan Road • Detroit 12, Michigan



Spicer Manufacturing Division is a highly specialized organization of engineering, manufacturing and executive skills in automotive power transmission.

Spicer has a record of 50 years of continuous experience in this field . . . more than any other manufacturer.

Spicer secures efficient production from 10 modern plants at its command . . . more than any other manufacturer.

Spicer has a range of proved products for almost every automotive power delivery need . . . more than any other manufacturer.

Spicer has the services you need—use them!





## **we serve the industry from A to Z**

Ambition to serve . . . and zeal to produce

. . . have built the famous Spicer line.

We meet at the drafting board . . . we

meet at the machine . . . we meet at the

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of the minds and the constructive

skills on every project. Each Spicer

product is a visible demonstration of that

cooperation. Use Spicer engineering

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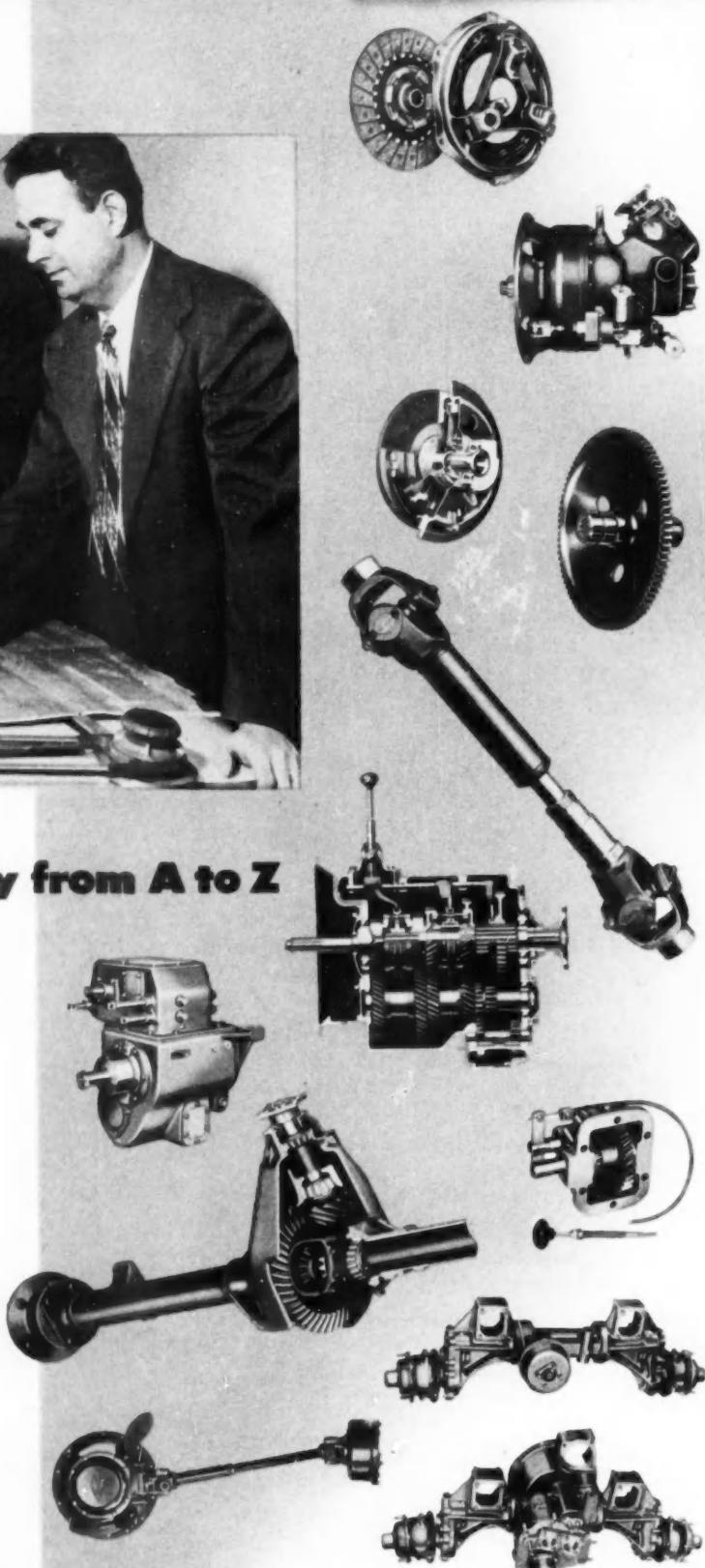
fulness to serve your needs—better!

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of Dana Corporation • Toledo 1, Ohio



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• PARISH FRAMES • TORQUE CONVERTERS • POWER TAKE-OFFS • POWER TAKE-OFF  
JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES • WELDED TUBING



# New Products

(Continued from page 108)

## Decelerograph

The Askania brake testing recorder is a self-contained recording instrument for measuring the efficiency of brakes in motor vehicles under actual driving conditions. The instrument produces a braking diagram. It can also be used as an accelerometer.

The recording is made by a sapphire stylus on waxed paper tape, so that no ink is required. A large air-damped inert mass and a low natural frequency make it possible to record brake efficiency with an accuracy of  $\pm 0.5$  per cent. The instrument is said to be sturdy built and portable (10 in. x 7 in. x 6 in.—total weight, 26 lb.).

*European Products Importing Co.*

Circle 39 on page 73 for more data

## Plug Cover

A new spark plug cover and cable assembly, especially designed to prevent "flash overs" caused by moisture and dirt such as is found in trucking operations, has been developed. Known as the Neosheath, it is integrally molded and is bonded to the insulation to provide thorough protection from the distributor to the spark plug electrodes, the company announced. Neosheath also adds to the efficiency of operations under heavy loads or hill climbing, particularly in wet weather, it was added. *Electric Auto-Lite Co.*

Circle 40 on page 73 for more data

## Colloidal Graphite

Recently developed is a colloidal graphite dispersion known as Glydag B. It is colloidal graphite dispersed in 1,3-butylene glycol, used as a source of colloidal graphite in rubber-lubricant formulations. *Acheson Colloids Co.*

Circle 41 on page 73 for more data

## One-Piece Screws, Bolts

Recently announced is the HOLTITE-Nylok line of one-piece self locking screws and bolts. They employ a nylon insert which conforms to the curvature of the screw threads and provides a positive locking action when stopped.

This locking is said to take place so smoothly and easily that the screw's

(Turn to page 112, please)

(Advertisement)  
AMERICAN CHEMICAL PAINT COMPANY  
AMBLER CHEMICALS  
ACP  
PROCESSES PENNA.

## Technical Service Data Sheet Subject: PROTECTING FRICTION SURFACES WITH THERMOIL<sup>®</sup> GRANODINE<sup>®</sup>

### INTRODUCTION

Fabricators and product designers, particularly in the automotive field, are aware that even highly polished surfaces under friction weld, gall and score. One of the most inexpensive and practical methods of preventing this is to coat the metal to prevent metal-to-metal contact. With cast iron or steel, the "Thermoil-Granodine" manganese-iron phosphate coating provides a wear-resistant layer of unusual effectiveness.



Thermoil-Granodizing greatly prolongs the life of parts subject to friction. It protects the surface of products like the diesel engine liners shown above and the many moving parts of automobiles and other machines. Thermoil-Granodine<sup>®</sup> with its remarkable lubricating properties is particularly valuable in these and similar applications because of its ability to retain oil and maintain lubrication under high pressures and high velocities. This ACP wear-proofing chemical not only permits rapid break-in without scoring, scuffing and welding but also reduces subsequent wear on friction parts.

### "THERMOIL-GRANODINE" PROTECTS RUBBING PARTS

Thermoil-Granodizing removes "fuzz" from ferrous metal friction surfaces and produces a coating of non-metallic, water-insoluble manganese-iron phosphate crystals which soak up and hold oil as bare untreated metal cannot do. The oiled crystalline "Thermoil-Granodine" coating on piston rings, pistons, cylinders, cylinder liners, cranks, cam-shafts, gears, tappets, valves, spiders and other rubbing parts, allows safe break-in operation, eliminates metal-to-metal contact, maintains lubrication and reduces the danger of scuffing, scoring, welding, galling and tearing of the metal. The work to be protectively treated is merely Thermoil-Granodized and oiled, usually with a soluble oil.

### "THERMOIL-GRANODINE" MEETS THESE SPECIFICATIONS

SPECIFICATION NUMBER	SPECIFICATION TITLE
MIL-C-16232 Type I	Coatings — phosphate; oiled, slushed, or waxed (for ferrous metal surfaces) and phosphate treating compounds.
AN-F-20 (See also U.S.A. 3-213)	Finishes, for electronic equipment.
U.S.A. 57-0-2C Type II, Class A	Finishes, protective, for iron and steel parts.
U.S.A. 51-70-1 Finish 22.02, Class A	Painting and finishing of fire control instruments; general specification for
M-364	Navy aeronautical process specification for compound phosphate rust-proofing process.

WRITE FOR FURTHER INFORMATION ON  
"THERMOIL-GRANODINE" AND ON YOUR OWN METAL  
PROTECTION PROBLEMS.



# New Products

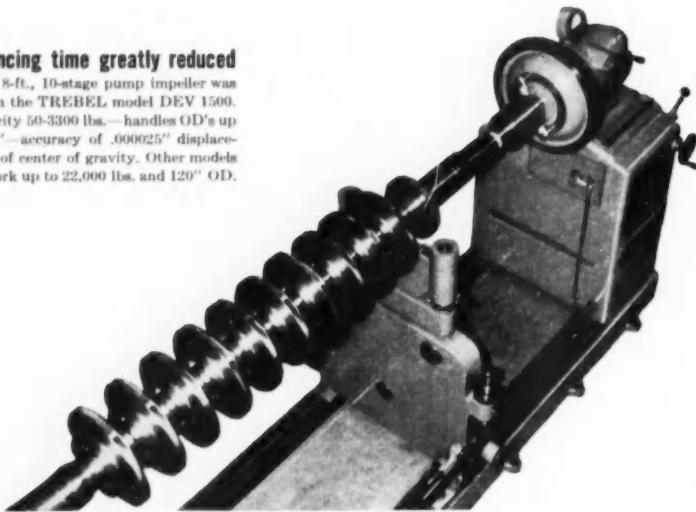
(Continued from page 111)

reusability is almost unlimited. The depth of the hole for the nylon plug has reportedly been reduced so that the screw is not weakened. *Continental Screw Co.*

Circle 42 on page 73 for more data.

## Balancing time greatly reduced

when 8-ft., 10-stage pump impeller was put on the TREBEL model DEV 1500. Capacity 50-3300 lbs.—handles OD's up to 65"—accuracy of .000025" displacement of center of gravity. Other models for work up to 22,000 lbs. and 120" OD.



## How major pump maker detects unbalance in seconds with TREBEL counter-vibration principle

That's all it takes—less than a minute—to locate amount and angle of unbalance in this 10-stage pump impeller, because—

TREBEL BALANCERS use a unique principle in which mechanical counter-vibrations counter unbalance.

No previous calibration is necessary—operator takes direct readings in the TREBEL BALANCER during the first run—amount of unbalance in ounce-inches; location in degrees. Any two balancing planes can be selected along entire length of the rotor. No cutting and trying—cross effect eliminated.

Readings in units of compensation—such as depth of hole to be drilled, or length of solder to be added—are possible.

No special skills are required.

When this pump manufacturer chose a Model DEV 1500—his third TREBEL—the machine was installed—and the operator trained—within two days. And it hasn't required a single service call in 12 months.

This is typical of TREBEL performance in hundreds of important plants here and abroad—the kind of performance you can expect, too.

Delivery is prompt; also engineering service and stock parts.

Write for Catalog "B" and ask for TREBEL demonstration at your plant



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Canadian sales by Kurt Orban Canada Ltd., Toronto, Canada

## Lead Bearing Alloy

Two qualities of lead bearing alloy steel are now available for shipment from warehouse stocks. The first is lead bearing AISI 4140, which is the standard AISI 4140 alloy to which 0.15 to 0.35 per cent lead has been added. It is said that lead bearing AISI 4140 will machine up to 50 per cent faster than standard medium carbon alloy steels.

In the annealed state lead bearing AISI 4140 can be machined at the same feeds and speeds as recom-

mended for C-1117 which has a machinability rating within about 15 per cent of that of B-1112 screw stock. In the heat treated condition, lead bearing AISI 4140 also machines 50 per cent faster than standard heat treated AISI 4140.

It is further stated that the addition of lead to standard AISI 4140 does not change the heat treating characteristics or hardenability. Mechanical properties developed in lead bearing AISI 4140 through heat treatment are said to be identical to the properties developed in AISI 4140 without lead.

In the low carbon, carburizing alloy field, lead bearing AISI 8620 has been made available from stock. This quality offers the same improvement in machinability as lead bearing AISI 4140, and may be heat treated in the same manner as standard AISI 8620 and with the same results. *Joseph T. Ryerson & Son, Inc.*

Circle 43 on page 73 for more data

## Truck Tire

An extra tread truck tire called the Super Fleetway is said to be the first commercial tire made with super-toughness rayon cord that is 20 per cent stronger than ordinary rayon. The tire has up to 79 per cent more flex fatigue resistance. It also has as much as 20 per cent more resistance to ruptures, assuring more recappings. The cords are bonded together with plastic resins.

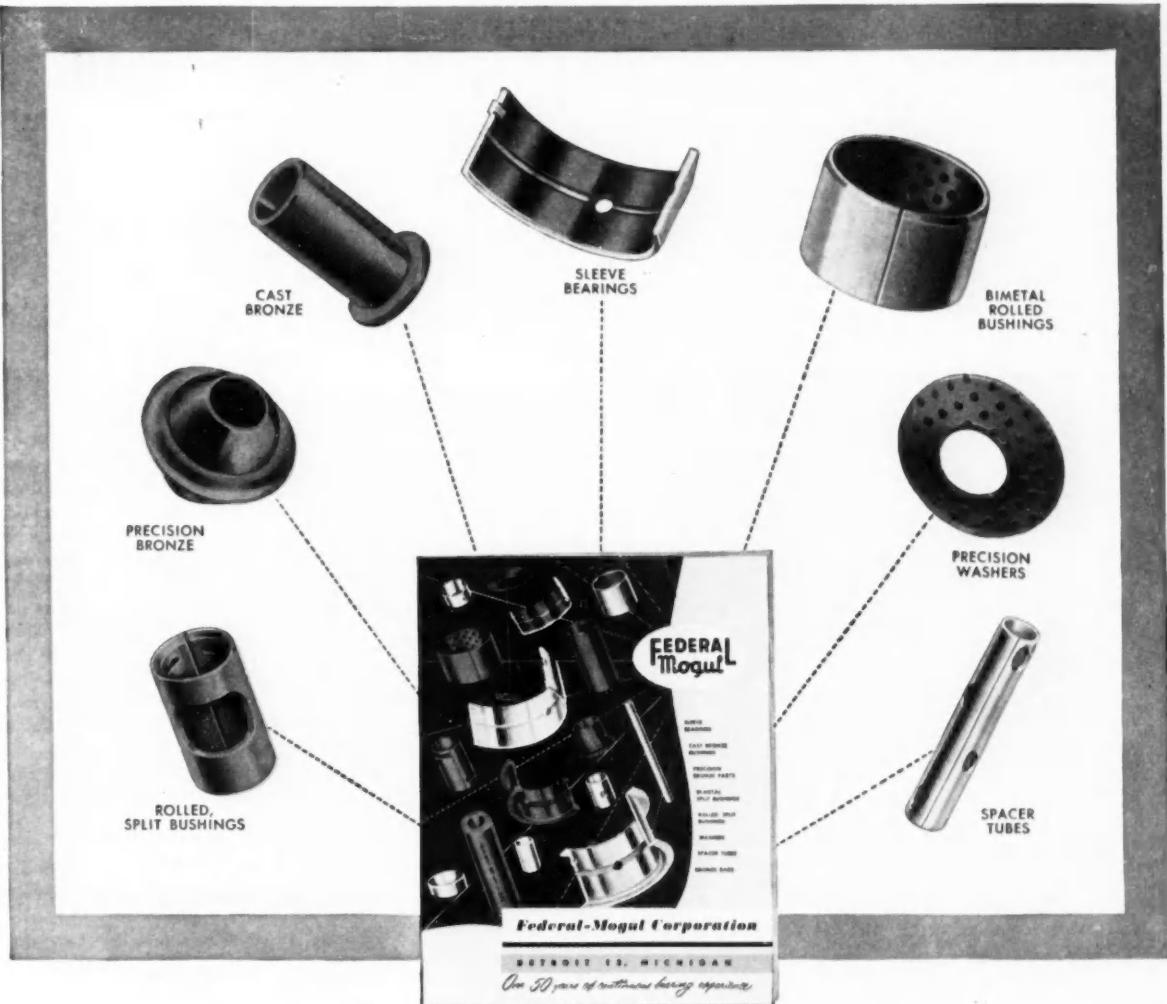
This tire has up to one and one-half times more tread rubber. The tread has been deepened, and the under-tread has also been made thick to give protection against penetration. Individual rubber supports that stabilize each of the extra-high ribs in this tire are designed to provide tread stability and assure even wear. *U. S. Rubber Co.*

Circle 44 on page 73 for more data

## Metallic Fabrics

A gold metallic yarn, known as Permagold, was developed primarily to meet the specifications of the automotive industry. Recent tests indicate that it will remain unchanged after one hundred hours' fadeometer exposure. For use in automotive fabrics, the new yarn is being woven with synthetic fibers. Ford Motor Co. is upholstering some 1954 station wagons in a combination of monofilament yarns and Permagold, and a similar fabric is used for slip covers for Buick anniversary promotion.

These fabrics are resistant to soil and dust, remain bright without (Turn to page 114, please)



## This handy reference catalog on Sleeve Bearings and related products is yours

*Free*

Here is a wealth of helpful, descriptive information on all types of sleeve bearings . . . on bearing metals, precision bronze parts and washers and similar products. Complete information on sintered and special-process copper-lead bearings . . . on how bearing performance is obtained at bushing costs with bimetal bushings . . .

how costly seamless tubing or pipe can be replaced in many applications with low-cost spacer tubes. Condenses over 50 years' experience as specialists in sleeve bearings and related products. Your business letter-head request brings your *free* copy promptly. No obligation—write today!

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# HOW PRESSTITE



## Windshield and Back Light Sealers

### Seal in the Quality of Automobile Bodies



Flow gun application of back light sealer between rubber weatherstrip and roof panel.

To keep fine automobile interiors perfectly dry during rain, warm in winter and clean, the windshields, windows and back light assemblies must be tightly sealed against water, air and dirt infiltration. Proper sealing is vital to the assurance of passenger comfort and owner satisfaction.

Presstite windshield and back light sealers form a tough, flexible and permanently tight seal between rubber and glass, as well as between rubber and metal. These non-migrating materials, available in non-staining light gray and in black, remain soft and pliable indefinitely; they will not lose their adhesion due to heat, cold or movement.

There are many other types of Presstite sealers used extensively in sealing automobile, truck and bus bodies, including body sealers, spot-weld sealers, washer-type sealers, expanding rubber sealers, elastic compounds, plastic sealers, web coating and Permagums.

Presstite, specialists in sealing compounds since 1924, will be glad to recommend the very best sealants to fit your requirements.

Rubber to metal sealing application on windshield opening.



In Canada: Railway and Power Engineering Corp., Ltd.

**PRESSTITE ENGINEERING COMPANY**

3760 Chouteau Ave. • St. Louis 10, Mo.



## New Products

(Continued from page 112)

tarnishing. Fabrics woven with Permagold are guaranteed to stand up to rigid wear and tear tests, are non-fading and tailor easily.

Permagold may, of course, be woven with any fiber. Metlon Corp.

Circle 45 on page 73 for more data

### Web Coating Sealer

A web coating material which is applied with a spray gun and provides a tough, resilient seal against water and dust has been developed. The No. 209 cobwebbing sealer is used principally in automobile construction as a water and dust tight seal on inside door panels, such as on hinge and latch assemblies, and other interior body applications. It is described as being capable of bridging cracks and holes up to an inch across.

The coating developed is either a continuous film or a coarse cobweb-like skin, depending on the size of the spray-nozzle opening and the distance the gun is held from the surface to be sealed.

With a base of special synthetic polymers, the material is also highly resistant to oil, naphtha and aromatic fuels. In consistency, it is a medium-thin syrupy substance of translucent cream color. It dries quickly on contact and forms an excellent bond to commercially clean steel or aluminum. It is stable and flexible at all working temperatures. *Presstite Engineering Co.*

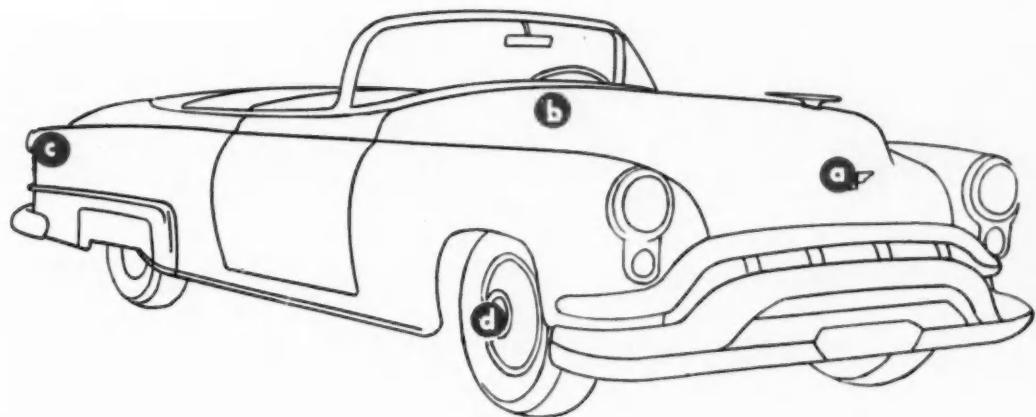
Circle 94 on page 73 for more data

### Synthetic Primer

Called Fleet-X 295 Light Oxide Red, a synthetic enamel primer-surfacer just announced helps give a high gloss finish to the enamel color coats through its excellent hold-out and filling qualities. Field and laboratory tests show that the enamel dries faster and harder. Reducers used in the top coats will not soften the surfa-

cer. The maker states the surfacer itself dries faster for easy sanding, although under most conditions sanding is not necessary. The product has excellent adhesion under all weather conditions. One double coat of the material gives good covering. *Acme Quality Paints, Inc.*

Circle 95 on page 73 for more data  
(Turn to page 118, please)



*A proven material for automotive  
styling . . .*

# DU PONT LUCITE\*

Forward-looking engineers are finding in Du Pont "Lucite" acrylic resin the combination of properties that makes possible many of their new designs in improved styling. Beautiful "Lucite" offers optical clarity, outdoor durability, shatter-resistance, strength and unique "edge-lighting" properties.

A few of the many examples in which these properties have been put to use are shown. Perhaps Du Pont "Lucite" and other members of the Du Pont family of plastic engineering materials can help you blueprint your ideas for the future. For full information, write: E. I. du Pont de Nemours & Co., (Inc.), Polychemicals Department, Room 1712L Du Pont Bldg., Wilmington 98, Delaware.

\*REG. U. S. PAT. OFF.

**Polymers**  
DEPARTMENT  
PLASTICS • CHEMICALS



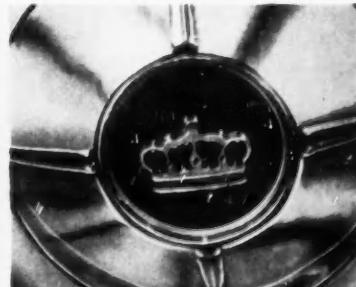
**a** HOOD AND TRUNK MEDALLIONS show the beautiful three-dimensional color effects that can be obtained with durable "Lucite." In normal use Du Pont "Lucite" is unaffected by gasoline or lubricants.



**b** INSTRUMENT-PANEL FACES are easy to read when made of sparkling "Lucite." Du Pont "Lucite" has excellent light-transmission characteristics . . . can be used to "edge-light" and "pipe" light around curves for greater lighting efficiency.



**c** TAIL-LAMP LENSES of "Lucite" combine eye-catching beauty with outstanding optical properties. "Lucite" may be molded in intricate shapes. It is strong and shatter-resistant . . . has good dimensional and color stability.



**d** HUB-CAP EMBLEMS inset with gleaming "Lucite" add a touch of distinctive styling that customers appreciate. Durable "Lucite" insures lasting beauty despite close-to-the-road service and constant exposure.

# NEW CARBOLOY

CEMENTED CARBIDE

## Increases production up to 30% on heavy-duty steel-cutting jobs

New Grade 370 Carboloy cemented carbide cuts more cubic inches of steel per minute — with longer tool life — than any existing carbide. The first of the new Series 300 cemented carbides, Grade 370 was specially developed for taking heavier cuts in steel at higher speeds than ever before practical.

### BUILT-IN TIP RIGIDITY

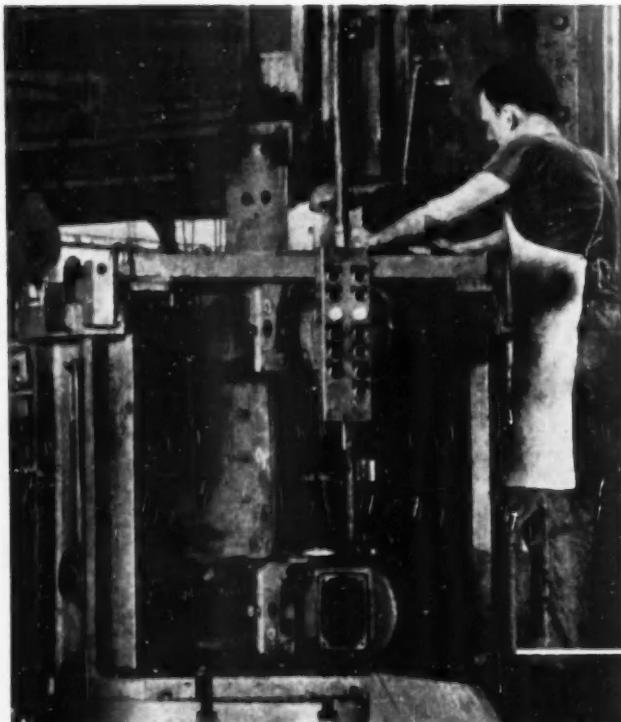
Heavy-duty, high-speed machining builds up great pressures and high temperatures which cause other tools to fail because their cutting edges deform. Grade 370 is made from start to finish by a new, carefully controlled manufacturing process which gives it a built-in structural rigidity to resist this deformation — even at temperatures of around 1800° F.

### PROVED PERFORMANCE

Grade 370 has already been proved, both in Carboloy laboratories, and on tough on-the-job customer applications such as rolls, gun barrels, locomotive wheels and other heavy-duty operations. It successfully withstands higher temperatures and pressures of heavy cuts at higher speeds, and lasts longer — longer than any existing carbide. Production goes up as much as 30%.

### AVAILABLE NOW

Grade 370 is available immediately in a number of sizes and shapes. Send coupon today for additional information and for free technical literature. The Carboloy Engineering Appraisal Service will work with you on specific applications.



Close-up of cylinder head forging. Grade 370 cuts large chips and withstands the tremendous pressure and temperature without deforming. With Grade 370, both machine downtime and tool cost per cubic inch of steel removed were substantially reduced.

Vertical mill taking  $\frac{1}{4}$ " to  $\frac{3}{4}$ " cut in an alloy steel casting for a traction motor frame. Grade 370 machined 70 FPM with .060" feed . . . and resulted in a reduction of tool costs of approximately 10 to 1 over other carbides.

# GRADE 370

Grade 370 takes a  $1\frac{1}{4}$ " cut in this 75" carbon steel forging of a hydraulic forming press cylinder head. The head is machined at 60 to 100 FPM with .055"-.060" feed.

## CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

"Carboloy" is the trademark for the products of the  
Carboloy Department of General Electric Company



CARBOLOY  
Department of General Electric Company  
11151 E. 8 Mile Street, Detroit 32, Michigan

Gentlemen: Rush me, at no cost or obligation, all facts now available on your new Grade 370 Carboloy cemented carbide.

Name \_\_\_\_\_

Company \_\_\_\_\_

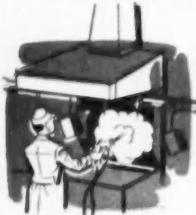
Position \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

# WANT TO LOWER YOUR PAINTING COSTS?

...and get a better paint job, too?  
Check the RANSBURG Processes!



Let's say you're a manufacturer of some painted product. Size and shape aren't too important. You're already using a conveyorized set-up, but you want a better quality finish . . . increased production . . . at less cost.

You've heard about electrostatic spray and some of the phenomenal results being achieved by Ransburg on other production lines. You write or call . . . say you want to know what Electro-Spray painting can do for YOU.



Ransburg engineers will help you investigate the possibilities. They'll gather complete data on your present operation, and check your facilities and requirements. If Electro-Spray is feasible, you will send samples of your unpainted products—with paint—to the Ransburg laboratories in Indianapolis. The labs are completely equipped, and the Ransburg engineers and technicians have every facility at their disposal for conducting extensive tests, simulating your production conditions.

After the preliminary studies and tests, you are invited to see your job run in the Ransburg Labs. There's no guess-work. You'll see the actual results. Paint and labor savings are determined. You can check the improved, uniform quality, and you'll be furnished drawings, showing the proposed installation for your own plant.

## ALL OF THIS WITHOUT OBLIGATION TO YOU!



After the Electro-Spray equipment is installed, Ransburg will continue to work with your finishing department. Ransburg engineers—men skilled in electrostatic spray painting—are always available to work with you on any problem which might arise in your finishing department. Fair enough? Let us hear from you.



RANSBURG

*Ransburg* ELECTRO-COATING CORP.

INDIANAPOLIS 7, INDIANA

## New Products

(Continued from page 114)

### Exhaust Systems

A line of heavy duty exhaust systems are now available with S-flow inner construction. The line will fit most exhaust systems with two-inch to four-inch outlet dimensions. The line includes the following accessories as well: Short tail pipes, bendable couplings, bendable tail pipes, straight tubing, 90 deg elbows, pipe hangers, "U" clamps, muffler hangers, and protective muffler cages. Features include hand welded domed heads, electrically welded seams, one piece construction of 16 gage inner tubes and nipples, non-clogging holes in inner tubes, extra large resonating chambers, 12 gage outer and inner heads and 16 gage outer shell. *Merit Muffler Div.*

Circle 96 on page 73 for more data

### Oil for Sludge

An engine conditioning oil now being made available is specifically designed to free hydraulic valve lifters that have stuck due to sludge or varnish deposits, and to eliminate exhaust smoking and reduce oil consumption caused by clogged passages in oil control rings. The new oil is not intended, however, for continuous use, but is recommended for one or two time use to correct conditions caused by sludge and varnish. *Shell Oil Co.*

Circle 97 on page 73 for more data

### Muffler

An increase of 10 to 15 per cent in horsepower combined with quiet operation is claimed for an automobile muffler now available as a replacement unit. Fiberglas chopped strands used in packing the straight-through muffler will not settle, burn, rot or corrode. *Hollywood Deep Tone Mfg. Co.*

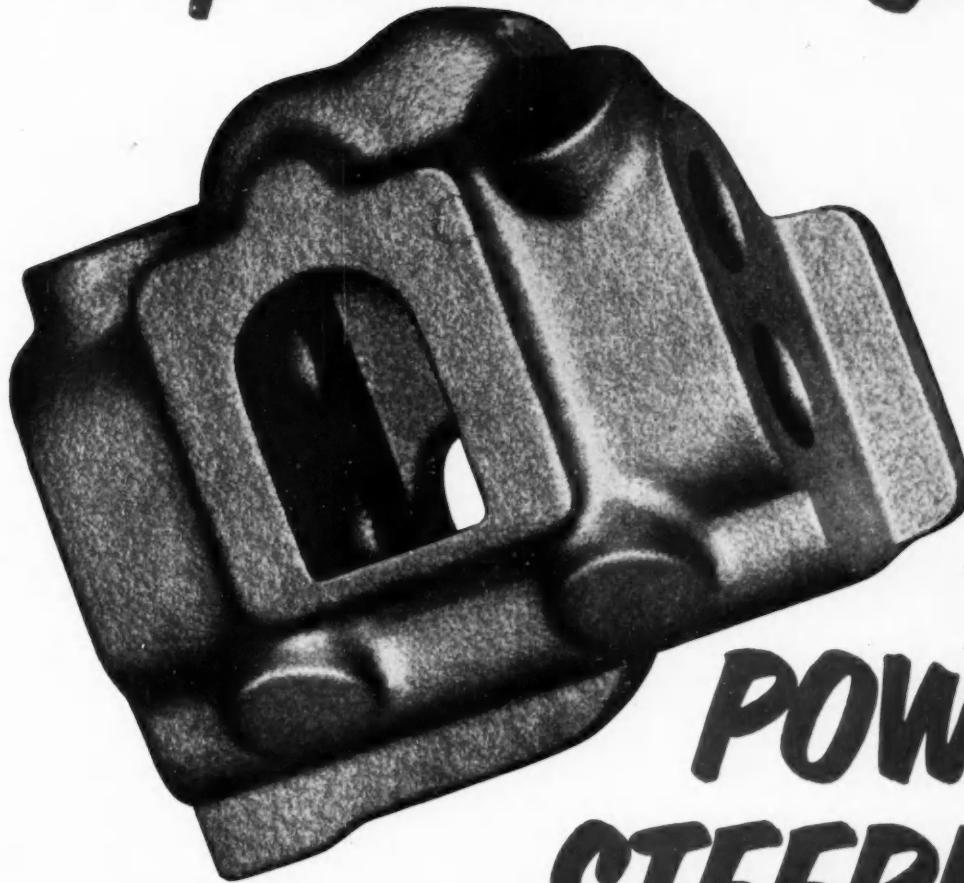
Circle 98 on page 73 for more data

### Phenolic Finishes

Parcolac 101 black and Parcolac 102 aluminum, pigmented phenolic resin finishes for use over Parco compound, were announced recently. Production pieces finished with these products have withstood 100 hours in salt spray. *Parker Rust Proof Co.*

Circle 99 on page 73 for more data

# Eaton Permanent Mold Gray Iron Castings-



for  
**POWER  
STEERING**



The EATON  
PERMANENT MOLD  
FOUNDRY

Send for your free copy of the 32-page illustrated booklet: "The Eaton Permanent Mold Foundry." It tells the story of Permanent Mold Castings and takes you on a picture-tour of the Eaton Foundry at Vassar, Michigan.

**EATON MANUFACTURING COMPANY**  
General Offices: CLEVELAND, OHIO  
FOUNDRY DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

 **PRODUCTS:** Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings • Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

# NIAGARA

## Presents

### outstanding design features:

Double End Twin Drive with double reduction gearing (for straight bends and smooth power application.)

A rigid One-piece Frame with permanently welded crown for minimum deflection and permanent alignment.

Laminated Non-Metallic Ways maintain accurate alignment and assure longest life of dependable service.

Deep Twin Plate Steel Bed with open slug clearance for multiple punching work.

Powerful Air Cooled Friction Clutch and Brake assures easy ideal "Press Brake Action".

Air Electric Clutch Control may be operated by palm buttons on ram or foot switch with provisions for "Inching", "Single Stroking" and "Continuous Run".

Reversible Flywheel can be pulled out of accidental stalls.

Power Adjusted Ram with self-locking adjusting screws.

Micrometer Dials accurately indicate position of ram so die settings can be quickly repeated.

Accessibility at rear with plenty of clear working space for safety.

Gages with full horizontal and vertical adjustment for front or rear of press.

Angle Support Brackets and Bolster Plates quickly convert press for stamping operations without affecting bending ability.

All gears operate in totally enclosed sealed baths of oil.

### versatility of operations

BENDING

FORMING

DRAWING

BEADING

CURLING

CORRUGATING

BLANKING

EMBOSSING

JOGLLING

NOTCHING

PUNCHING

PIERCING

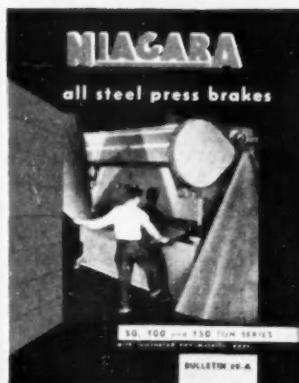
PERFORATING

SLITTING

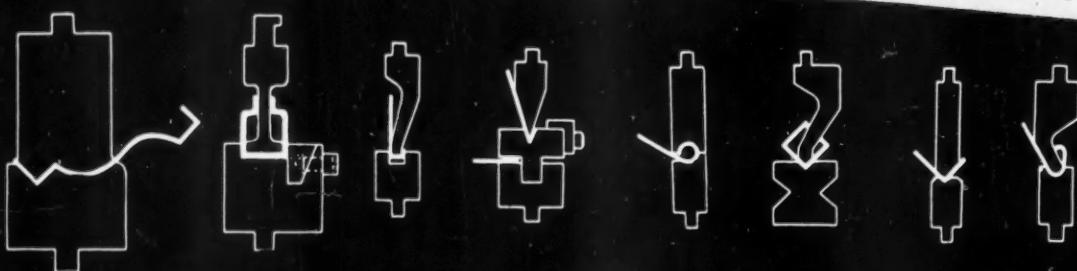
TRIMMING

ETC.

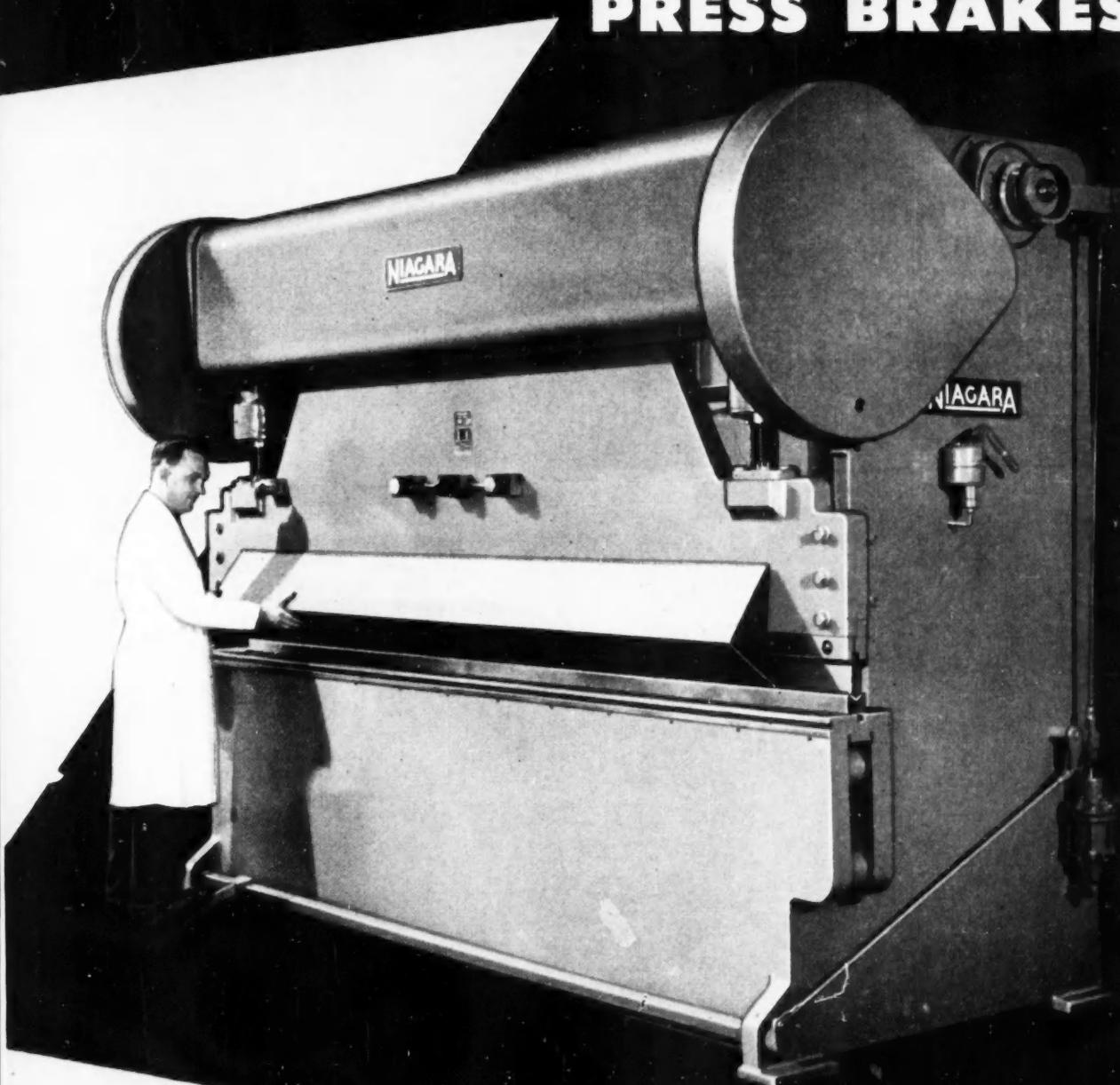
WRITE FOR BULLETIN 89



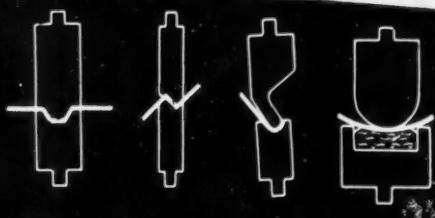
NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N.Y.



# The Last Word in New All-Steel PRESS BRAKES



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America's Most Complete Line of Presses, Shears,  
Machines and Tools for Sheet Metal Work

Dealers in principal U. S. cities and major foreign countries

## New Aircraft PRODUCTS

(Continued from page 76)

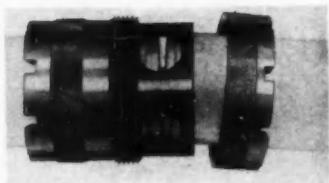
### Coupling

Now in production, the Wig-O-Flex coupling was designed primarily for aircraft (fuel lines, oil lines, air lines,

fire extinguisher lines, and general plumbing lines) but can be used on any equipment where gas or liquid is transferred.

It is said to be 80 per cent lighter than other standard connections. It is capable of taking care of misalignment to 1/6 inch, tube separation to 1/4 inch, and allows at least 4 deg tube flexure. It cannot blow apart because its design provides metallic retention of the tube ends. Its design allows this union to serve as a good slip joint, or to function as a packing gland. It assembles on standard tube

beads, and requires only standard O-rings . . . both in size and materials. This new sleeve-and-O-ring type



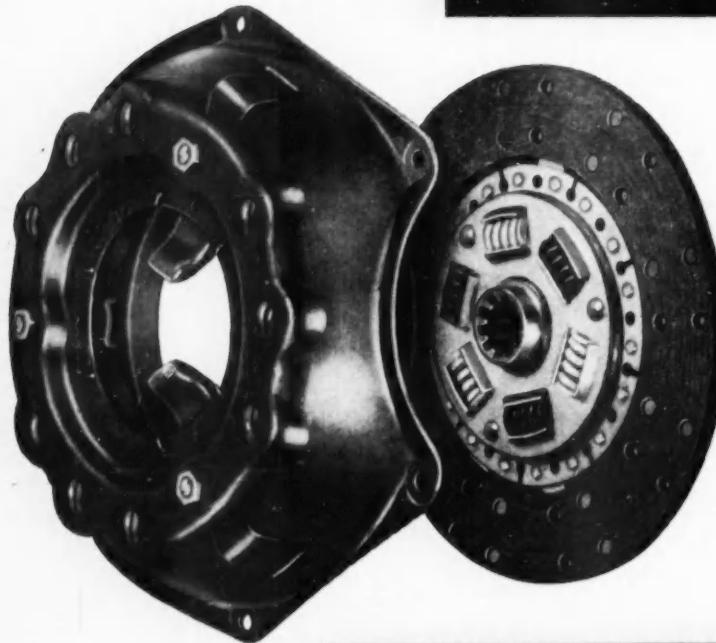
fitting has been shown by tests to be leakproof even at three times the pressure encountered in current jet aircraft. It maintains a tight seal in temperatures ranging from -65F to about 600F.

This coupling is available from stock in sizes 1 inch, 1 1/4 inch, 1 1/2 inch, 1 3/4 inch, 2 inch, 2 1/2 inch, 3 inch, 3 1/2 inch, 4 inch. E. B. Wiggins Oil Tool Co.

Circle 51 on page 73 for more data

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...means  
MAXIMUM  
PERFORMANCE  
MINIMUM  
MAINTENANCE!



You can depend on



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BORG & BECK DIVISION • BORG-WARNER CORPORATION  
Chicago 38, Illinois

**BORG & BECK®**

CLUTCHES...FOR THAT VITAL SPOT WHERE  
POWER TAKES HOLD OF THE LOAD!

### Jet Starter

A motor generator set supplying a source of constant-current, variable-voltage electric power for jet engines is being announced. Rated at 500 amps, 28.5 volts dc continuously, the set can also supply 700 amps for three minutes, or 1000 amps for one minute intermittent duty.

The model 925 aircraft energizer is designed for jet engines equipped with variable voltage electric starters. It provides variable voltage to produce constant current of 500 to 1000 amps over a range of 10 to 28.5 dc. Current regulation is plus or minus 10 per cent.

The direct current generator is of the compound wound type with interpoles and separate (inbuilt) excitation. On a common shaft is a 25 hp, 220/440 v, three phase, 60 cycle squirrel cage induction motor operating at 1750 rpm. Motor Generator Corp.

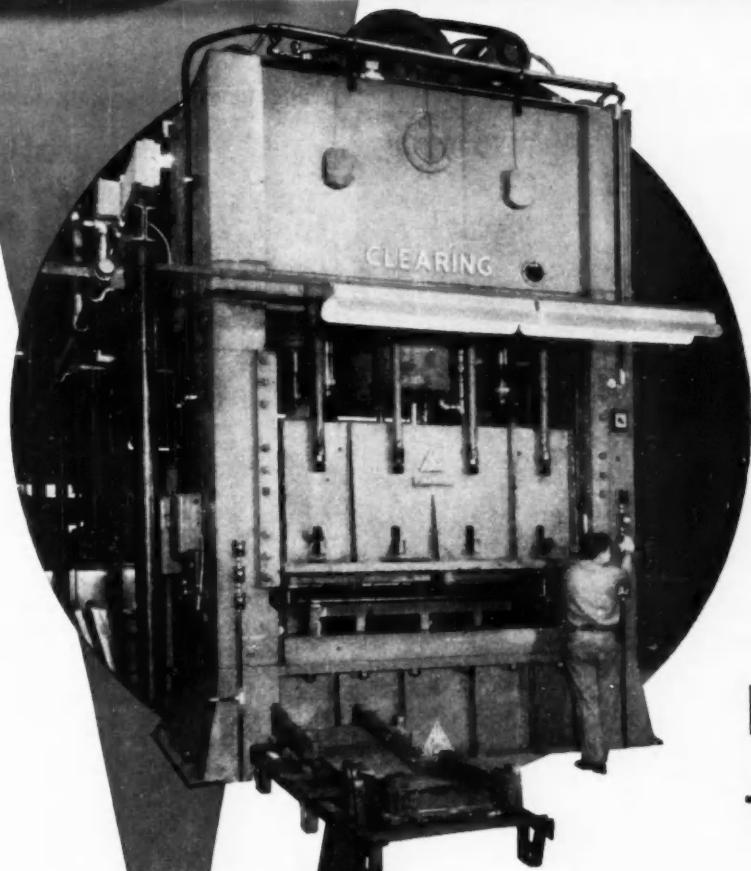
Circle 52 on page 73 for more data

### Refueling Adapter

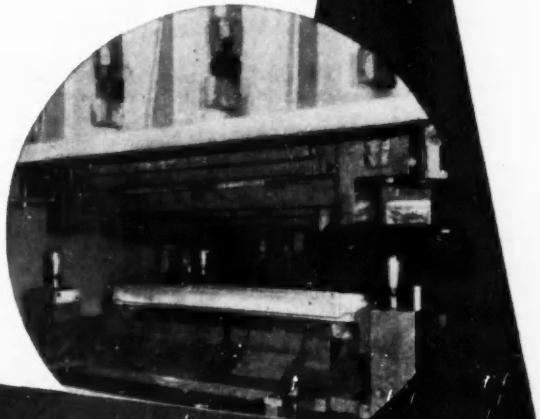
A single point adapter for use with a quick-coupling, single point aircraft refueling nozzle has been announced. The adapter, mounted under the wing, is said to offer these features: A tapered seat which is self-centering and cannot cock, internal contour that provides maximum flow with minimum pressure loss, made in all standard military designs, and made to special body designs.

The nozzle is self-adjusting and need not be readjusted to fit any qualified adapter. A swivel elbow

(Turn to page 124, please)



This closeup of the die area shows a refrigerator door on a Clearing 400 ton straight side press.



## CLEARING PRESSES

Head the Line at  
**Hotpoint**

When a company sweeps into production on the scale of Hotpoint's new refrigerator plant, heavy emphasis is placed on quality control. Responsibility for accuracy looms as important as efficient production.

The Clearing presses standing at the very beginning of the entire process assume much of this burden. At this point dependability and accuracy of press operation affects subsequent finishing and assembly operations.

This is the kind of service these presses were designed and built for—the kind of service they perform in hundreds of installations throughout the country. So if you plan to renew or expand production facilities, take a tip from the masters of mass production, call on Clearing Machine Corporation.

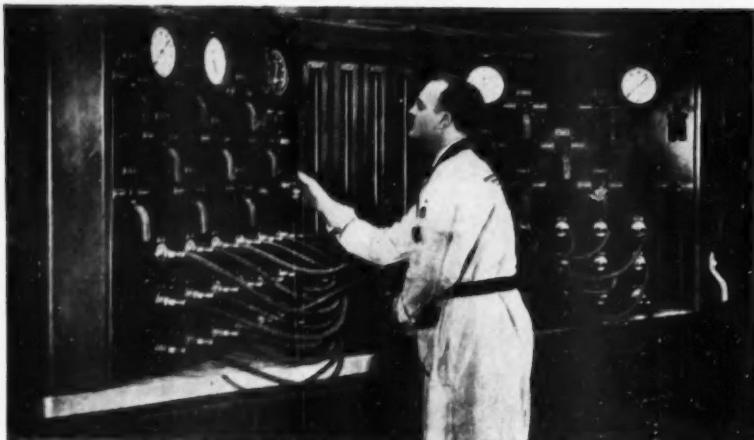
THE WAY TO EFFICIENT MASS PRODUCTION

# CLEARING PRESSES

CLEARING MACH



St., Chicago 38, Illinois • HAMILTON DIVISION, Hamilton, Ohio



A fuel flow distributor for the Westinghouse J-40 jet engine is checked for accurate and dependable performance by an expert inspector. Greer precision-engineered and built the test machine above to meet the precise test requirements of Westinghouse.

## Westinghouse Jet Engines Under Rigid Quality Control



Greer Hydraulic Control Pump Test Stand meets the high quality control standards required at Westinghouse. Components are inspected under simulated flight conditions.



Westinghouse lube pump for J-40 jet engine gets thorough inspection with Greer built test stand. Accurate readings from meters and gauges decide components dependability.

**Greer Hydraulics Inc. 442 Eighteenth Street, Brooklyn 15, New York**

Field Offices: 1908 West Cermak Road, Chicago, Illinois • 25 South Main Street, Dayton, Ohio 2832 East Grand Boulevard, Detroit, Michigan • and sales representatives in all principal cities

### Greer Test Equipment subjects jet components to rigorous inspection

A thorough quality control system is maintained at Westinghouse to make sure each J-34 and J-40 jet engine component will stand up in use. These complex parts are put through grueling tests under simulated flight conditions to ferret out weaknesses and determine air worthiness. The test equipment must give a true picture of performance.

That is why Westinghouse chooses Greer. Because Greer test machines are precision-engineered to give the same accurate, dependable results regardless of place, conditions or operator. Greer equipment is in use the world over by leading aircraft manufacturers and airlines.

Greer designs and builds to meet your out-of-ordinary test requirements, and in addition, has a complete standard line of machines to check all systems of all aircraft—so standardized they can be ordered directly from our catalog.



## New Aircraft PRODUCTS

(Continued from page 122)

couples, locks and controls flow. Operation of auxiliary controls is unnecessary. It automatically seals itself when disconnected. Both the adapter and the nozzle are designed for fueling and defueling. Buckeye Iron and Brass Works.

Circle 53 on page 73 for more data

### Plug-In Relay

Type 26P18 sub-miniature, hermetically sealed relay is actuated by a rotary motor that has a high torque factor to size and weight ratio. It is thoroughly degassed and nitrogen filled at a pressure of one atmosphere.



Tests conducted under USAF supervision prove that this relay exceeds the requirements of MIL-R-5575B. The relay operates under vibration of 10 to 500 cps at 10 g and also under a shock of 50 g.

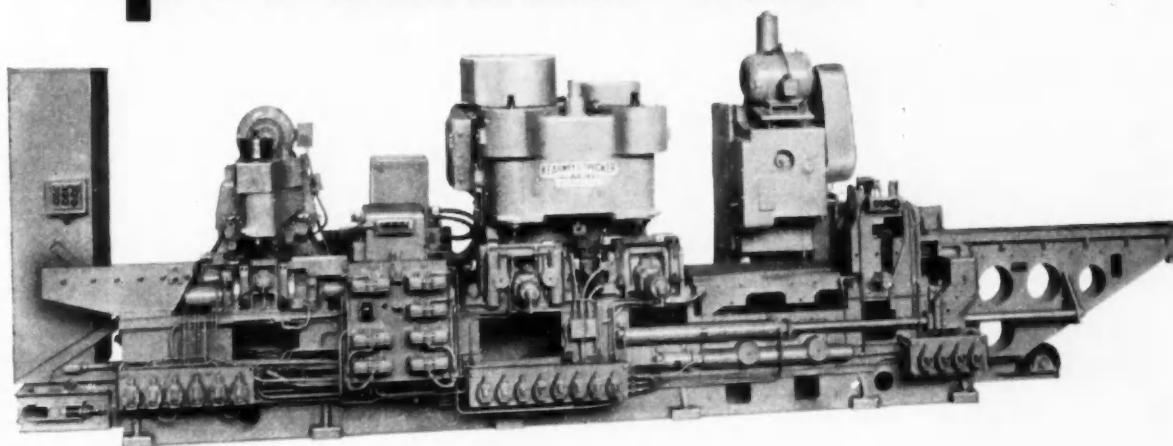
Type 26P18 is for operation at a nominal voltage of 26.5 volts dc. It may be had in a wide range of coil resistances—up to 19,000 ohms for plate circuit applications.

Contact arrangement is break-before-make and rated at three amps resistive load, 1.5 amps inductive load, and 12 amps overload at 26.5 volts dc. The unit has a diameter of one in. and a case height of 19/16 in. It operates in any position and is shock resistant in all planes.

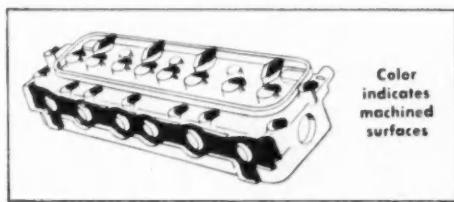
This relay is also available in two, three, and four pole double throw contact arrangements. Solder type terminals are also available for all contact arrangements. Filters, Inc.

Circle 54 on page 73 for more data

# Talk about production...



**For the customer...  
it put a one-at-a-time rough  
and finish milling job on a  
production basis!**



**Capacity . . . Experience . . . Performance**

Upon completion of this \$5,200,000 expansion of our Special Machinery Division, we offer you (1) unmatched facilities, (2) experience based upon more than 50 years in the design and production of special machinery, and (3) performance, best recommended by our outstanding record of successfully solving many hundreds of unusual machining problems.



**T**HIS special seven-station traveling head transfer type milling machine solved an automotive manufacturer's problem that involved milling cylinder heads. Formerly, rough and finish milling of a six-cylinder head required six distinct machining operations and seven separate handlings. Now, by combining all the machining operations and eliminating handling...the special machine produces 62 finished pieces per hour.

**TRAVELING HEADS . . .** three heads — one with one spindle and two with three spindles. Full quill adjustment on all spindles. Speeds are fixed. Heads travel hydraulically on hardened and ground ways.



**For more details on this machine . . .**

ask for *Data Sheet No. 1003*. Free booklet, "Doorway to a proven method for solution of big and small metalworking problems" is also yours for the asking. Write today to SPECIAL MACHINERY DIVISION, KEARNEY & TRECKER CORP., 6784 West National Ave., Milwaukee 14, Wisconsin.

**KEARNEY & TRECKER CORP. • Special Machinery Division**

MILWAUKEE 14, WIS., U.S.A.

# New British Vehicles at Glasgow Show

(Continued from page 43)

suitable for the "Alpha's" underfloor engine mounting. Power unit is a 6-cyl Gardner Diesel developing 112 hp at 1700 rpm.

Full-forward control appears again in a five cu yd dump truck just brought out by Leyland. The Comet 90 chassis has been altered by moving the front axle back seven in. to shorten the wheel base and increase

the front overhang, overall length is reduced, and controls are shifted ahead.

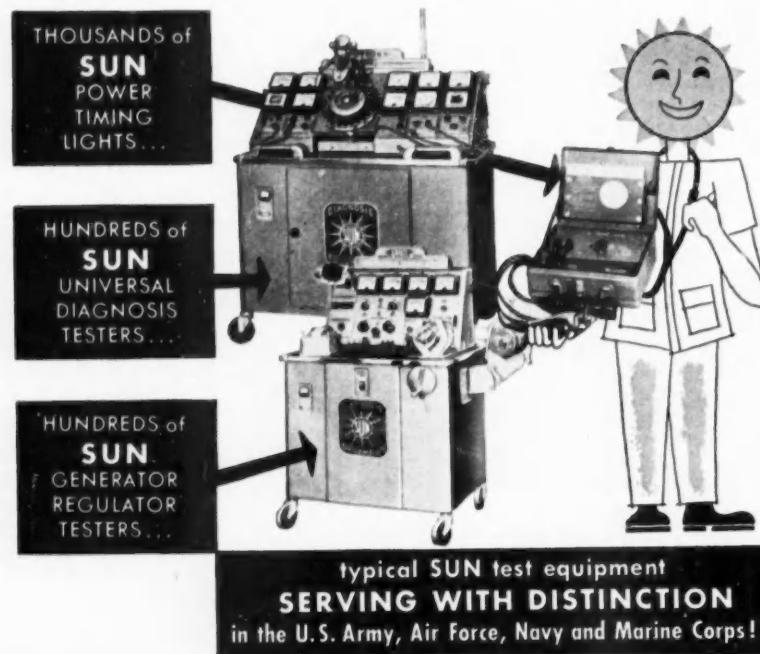
Leyland's 90 hp six-cyl Diesel drives the two-speed rear axle through a new five-speed gearbox embodying heavier construction throughout and remote gear-change mechanism. The new Comet 90 is also seen as a suitable chassis for pas-

senger vehicles for export. The company has announced that the semi-automatic air-operated transmission, which it has developed jointly with Self-Changing Gears, Ltd., under Wilson and Leyland patents, will be used in its buses and coaches next year.

The Bedford seven-ton short-wheel-base dump truck, shown at Glasgow for the first time, is offered with either a 115 hp gasoline engine or 108 hp Perkins R6 Diesel. A 24-v system is used for starting and lighting.

In the field of lightweights, the  $\frac{1}{2}$ -ton delivery van by Bedford is now equipped with a utility body named the Dormobile. It has a pair of multi-purpose benches, each in four sections with foam rubber cushions, which may be folded up flat against each side wall. Sections may also be re-positioned to form two central seats and a double bench at the rear—all forward-facing with backrests. Accommodation may thus be altered to seat 12 passengers as a light bus, seven as a station wagon, to sleep two, or to provide floor space for a  $\frac{1}{2}$ -ton load.

Weight reduction, leading to improved fuel consumption and larger payloads, was the keynote of the new A.E.C. vehicles shown at Glasgow. The 44-seater "Monocoach," featuring integral construction, has an empty weight of under  $5\frac{1}{2}$  tons. Body is of stressed sheet riveted to special section extruded aluminum alloy frame members. Full-forward control and flat floor throughout are made possible by underfloor engine mounting. The horizontal 6-cyl Diesel is offered in two sizes: 98 hp at 2000 rpm with 4.13 in. bore and 5.12 in. stroke (410 cu in. piston displacement), and 112 hp at 2000 rpm with 470 cu in. piston displacement having 4.41 in. bore and 5.12 in. stroke.



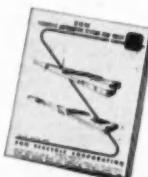
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copper or brass throughout  
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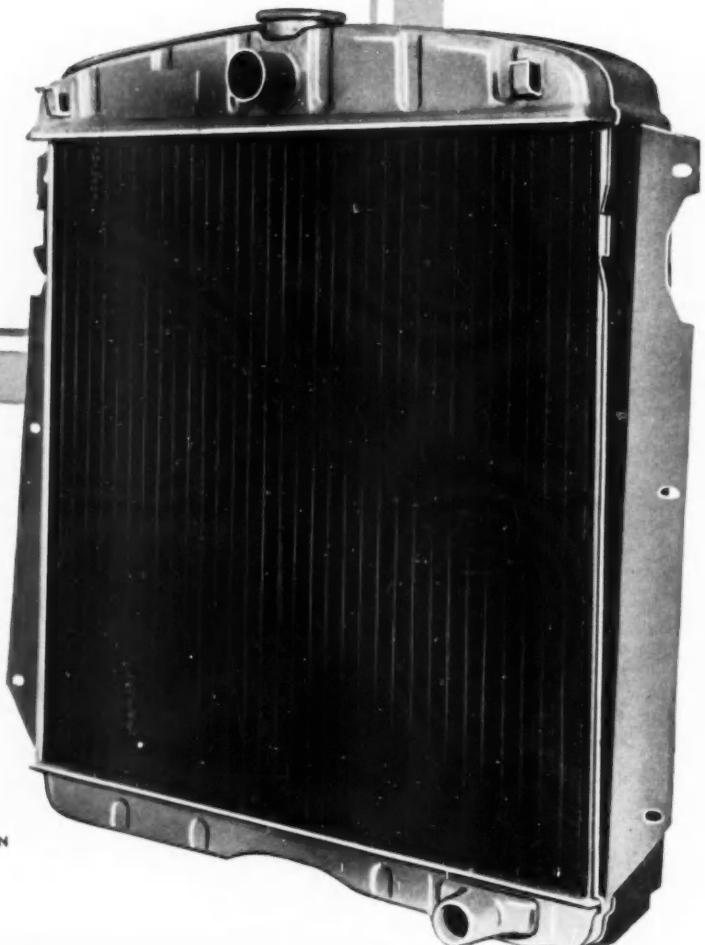
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RADIATOR  
DIVISION

GENERAL MOTORS CORPORATION  
LOCKPORT, NEW YORK

# HARRISON

## New Defense Facilities

SUPPLEMENTING the list of Certificates of Necessity issued up to October 19, 1953, authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which were published in the November 15 issue, page 212, of AUTOMOTIVE INDUSTRIES, the following additional certificates were announced by the Defense Production Administration, October 19, 1953, to November 30, 1953.

Included in this latest tabulation, 18,427 new or expanded defense facilities of all types have been authorized for rapid tax write-offs, the total amount eligible for amortization being \$28,800,257,000. These figures are exclusive of cases that are up for later review but included in this list—in these cases, no dollar amount is listed. The figure appearing in parentheses is the percentage authorized for actual fast tax write-offs.

### —A—

**B. H. Aircraft Co., Inc., Farmingdale, New York**  
Aircraft parts—\$89,275 (45)  
**Airesearch Mfg. Co., Div. of Garrett Corp., Phoenix, Arizona**  
Aircraft components — \$514,608 (55)  
**Airesearch Mfg. Co., Div. of Garrett Corp., Los Angeles, Calif.**  
Aircraft parts—134,568 (65)

### —B—

**Bendix Aviation Corp., Eclipse Pioneer Div., Teterboro, N. J.**  
Aircraft parts—\$79,254 (65)  
**Bendix Aviation Corp., Pacific Div., North Hollywood, Calif.**  
Research, development and production of electronic equipment—\$200,000 (40)  
**The Brunswick-Balke-Collender Co., Muskegon, Mich.**  
Aircraft parts—\$35,845 (65)

### —F—

**Farmingdale Machine & Tool Co., Inc., Farmingdale, New York**  
Machining of precision aircraft parts—\$27,345 (70)

### —G—

**General Electric Co., Schenectady, New York**  
Research & development for military end items—\$3,850,000 (55)  
**Giddings & Lewis Machine Tool Co., Fond du Lac, Wisconsin**  
Machine tools—\$150,000 (40)  
**Goodyear Aircraft Corp., Litchfield Park, Arizona**  
Aircraft parts—\$59,690 (65)

### —L— Lear, Inc., Learal Div., Los Angeles, Calif.

Scientific & technical equipment for defense—\$60,112 (65)  
**Lockheed Aircraft Corp., Burbank, Calif.**  
Aircraft & aircraft parts—\$61,152 (65)  
Aircraft—\$73,133 (60)  
**Lord Manufacturing Co., Erie, Pa.**  
Aircraft parts—\$82,309 (65)

### —M—

**The M. B. Mfg. Co., Inc., New Haven, Conn.**

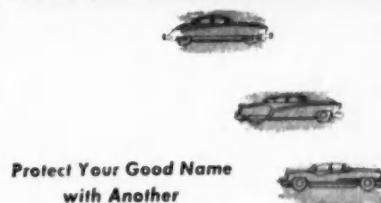
Aircraft parts—\$83,745 (70)  
**Mercury Tool & Die Co., Inc., Ferndale, Mich.**  
Special machinery, tools and dies—\$120,000 (45)  
**Micro-Precision, Inc., Evanston, Illinois**  
Aircraft parts—\$320,000 (45)  
**Motor Wheel Corp., Lansing, Michigan**  
Ordnance—\$850,000 (60)

(Turn to page 130, please)

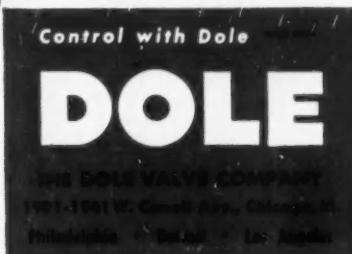
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trucks and tractors  
who  
control  
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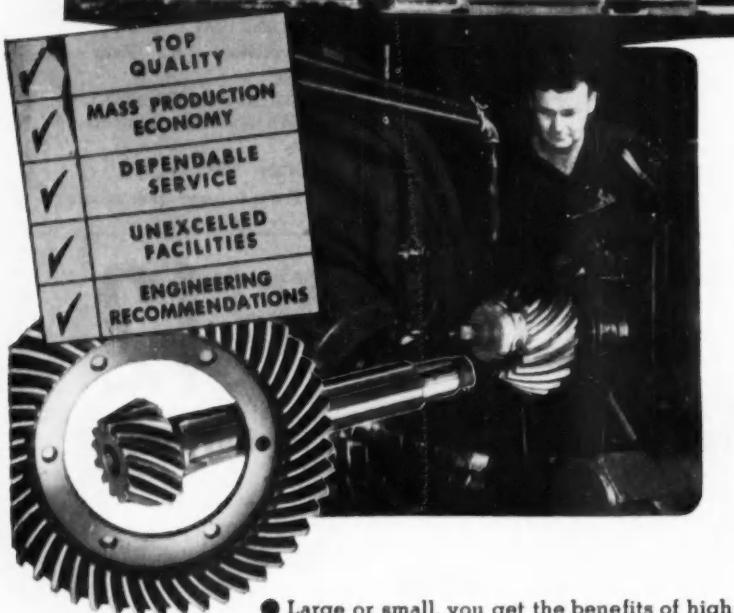
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**FAIRFIELD**  
MANUFACTURING CO.

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Lafayette, Indiana

(Continued from page 129)

— N —

The National Acme Co., Cleveland,  
Ohio

Machine tools—\$206,142 (65)

Northrop Aircraft, Inc., Hawthorne,  
Calif.

Aircraft and aircraft parts—\$202,-  
822 (60)

— R —

Reo Motors, Inc., Lansing, Michigan

Military vehicles—48,470 (65)

Republic Aviation Corp., East Farm-  
ingdale, L. I., New York

Aircraft and parts—\$618,000 (40)

Rohr Aircraft Corp., Chula Vista,  
Calif.

Aircraft components—\$744,199 (55)

— S —

Schiller-Pfeiffer Machine Works, Phil-  
adelphia, Pa.

Ordnance—\$45,756 (60)

Stewart-Warner Corp., Stewart-War-  
ner Electric Div., Northbrook,  
Illinois

Research, development and produc-  
tion of military communication  
equipment—\$2,500,000 (65)

— T —

The Tubular Products Co., New  
Britain, Conn.

Aircraft parts—\$39,911 (70)

United Aircraft Corp., Hamilton  
Standard Div., Windsor Locks,  
Conn.

Aircraft components—\$321,705 (65)

— U —

United Aircraft Corp., Sikorsky Air-  
craft Div., Bridgeport, Conn.

Aircraft parts—\$200,000 (65)

— W —

The Watson-Stillman Co., Div. of  
H. K. Porter Co., Inc., Roselle,  
New Jersey

Machine tools—\$156,800 (65)

## BOOKS ...

FOURTH SYMPOSIUM (INTERNATIONAL) ON COMBUSTION, published by The Williams & Wilkins Co., Mt. Royal & Guilford Aves., Baltimore 2, Md., Price \$7.00. Despite limitation of the subject to problems of combustion and detonation waves, it is interesting to note that this symposium, held at Massachusetts Institute of Technology, Sept. 1-5, 1952, attracted more people and more papers than the previous one. An innovation of this symposium is the inclusion of survey papers which have been carefully selected as to subjects and speakers to provide up-to-date summaries of the developments in limits of inflammability, ignition, flame structure, and burning velocity measurements, instability phenomena such as cellular flames, quenching, flash-back and blow-off, interaction of combustion waves and stream turbulence, burning of fuel jets, and flame stabilization by obstacles in the stream. Outstanding papers on the subject and selected round-table discussions have been compiled in this 926-page volume.

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# EVANITE

**the only  
battery  
separator  
with all  
these  
advantages!**



Evanite is an improvement over nature! Wood has long been recognized as the most satisfactory low cost separator material. Now the new Evanite *interwoven wood fibre* separator utilizes wood in improved form. Evanite separators, tested in 20,000 batteries in daily use up to three years, have delivered more than their guaranteed battery life without a single separator failure.

Write today for full details on Evanite—Made *only* by Evans Products Company, Western Division, Dept. P-12, Plymouth, Michigan. Mills at Coos Bay, Ore.; Roseburg, Ore.; Vancouver, B. C.

*Ask your battery manufacturer for complete product and case history information on the advantages of Evanite.*



Uniform high quality—  
every Evanite separator  
is identical whether  
you compare two or  
two million.

#### **Compare These Advantages of Evanite Separators**

**TESTED IN 20,000 VEHICLES** for periods up to 3 years under actual operating conditions.

**OUTSTANDING PERFORMANCE**, equaling or surpassing conventional separators.

**NO SPLITS, NO CRACKS**—Completely uniform. No candling required.

**NO TREATING, NO WET HANDLING**—Treated at the factory and shipped dry.

**CUTS SHIPPING COSTS**—Much lighter than ordinary separators.

**ECONOMICAL**—Cost no more than ordinary treated wood separators.

**BACKED BY EXPERIENCE**—Produced by Evans, whose years of experience are your assurance of finest quality.

**EVANS**

**WORLD'S LARGEST MANUFACTURER**

**OF BATTERY SEPARATORS**



## Heat Treating Aircraft Screws

(Continued from page 39)

agitate the oil to provide an even quench.

Quenched parts are then taken on an inclined steel belt conveyor from the quench pit to a woven steel belt conveyor that feeds in sequence the second wash and the tempering oven.

After removing the quench oil in the second wash, the tempering oven

operation lowers screw or bolt hardness from about 50 RC to any desired level.

Since tempering is the longest operation along the line, it pretty much controls the speed of production, although there is a time lag between furnace operations. It takes approximately one hour to temper aircraft specialty parts.

A pit for rustproofing the finished product is included at the end of the line. Another inclined conveyor takes the parts out of the dip tank and drops them on a vibrating screen conveyor to remove excess oil. This con-

veyor finally deposits the parts in bins at the end of the furnace line.

The new furnace line, designed and installed by Surface Combustion Corp., can heat treat more than half the plant's production of Unbrake standards and specialty aircraft fasteners. Standard Pressed Steel is currently considering a second such line to further increase production.

SPS engineers have devised an automatic signal system for the furnace temperature control. If anything goes wrong with heat-treat timing, bells are sounded and spot lights go on to notify operating personnel.

At the end of the furnace line, a quality control center has been established. This station will eventually be conveyorized to conform with the furnace line. For the quality control check, five different samples are taken from each tote box which contains about 1200 lb of screws.

## Manufacturers of... HARDENED and GROUNDED PARTS for over 40 years



SINCE the day of the duster and goggles, The Brown Corp. has meant highest quality precision parts for the automotive industry. Today, Brown Parts serve trucks, tractors, trailers, buses, axle builders, off-the-road machines and Diesel locomotives. The production methods and facilities we have developed are unequalled — uniform product quality is assured—deliveries are reliable—service is efficient. Ask any of our long list of satisfied customers throughout the industry.

For further information about our specialized production of hardened and ground automotive and industrial parts, just drop us a note. We invite an opportunity to quote on your work.

*Henry W. Brown*  
PRESIDENT



Parts include . . .  
King Pins  
Shackle Bolts  
Shackle Pins  
Brake Anchor Bolts  
Countershafts  
Idler Shafts  
Stub Axle Shafts  
Steering Ball Bolts  
Beam Balls and Bolts  
5th-Wheel Rocker Shafts  
Wheel Studs  
Water Pump Shafts  
. . . anything in the hardened and ground line, of any analysis steel, up to 4 1/4" diameter.

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C. H. Ehliert, 3407 Clarendon Rd., Cleveland • N. F. Spring, 4716 Ballou Rd., Detroit • R. C. Sanderson, 5609 N. Clark St., Chicago • Harry J. Windmiller, 1704 Carlton, Fort Worth • John William & Co., 1440 N. Spring St., Los Angeles, Calif. • John B. Hunt, 5611 S.E. Yamhill St., Portland, Ore.

## BOOKS . . .

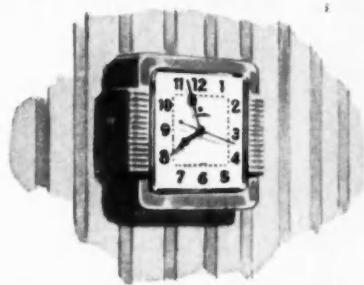
DIAMOND TECHNOLOGY, by Paul Grodzinski, published by N.A.G. Press, Ltd., 226 Latymer Court, Hammersmith, London W. 6, England. Price, \$10.00. This work is based to a large extent on the traditions of craftsmanship, but includes full information on all modern discoveries and techniques that have been applied in the diamond field. Some of the subjects dealt with are: technology of machining methods; general survey of polishing and grinding; manufacture of watch and instrument jewels; manufacture of diamond and sintered carbide dies; industrial diamonds—selection and orientation; setting diamonds in tools; and grinding and lapping sintered carbides.

THE SCIENCE OF PRECISION MEASUREMENT, published by The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. Price, \$3.50. This 264 page textbook is the basis for a thorough education in the fundamentals of precision inspection techniques for control of quality in product manufacturing. Beginning with a discussion of the history, development and purpose of precision measurement, the text unfolds a panorama of the measuring devices employed by man in his technological progress from ancient times. The text discusses the constant and unchangeable wave length of light as the universal basis of present-day precision measurement, and its practical embodiment in the form of gage blocks. All ramifications of the application and care of gage blocks are given in a simple, and logical manner. The direct use of gage blocks as measuring tools in fixed and indicating gage assemblies is shown with application photographs and charts. Precise information on angle measurements, use of optical flats and interpretations of fringe lines, use of comparators, checking of micrometers, thread and gear measurements, etc., is also covered. Photographs, diagrams, and charts are used to tell the story whenever possible, and this graphic approach contributes to the interest and understandability of this book. Complete sets of tables so vital in reducing computation time in gaging practice are shown in the last section of the book.

# Gemmer "HYDRAGUIDE"

THE BEST IN  
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*Full time*



With exclusive proportional valving,  
"HYDRAGUIDE" is in operation whenever  
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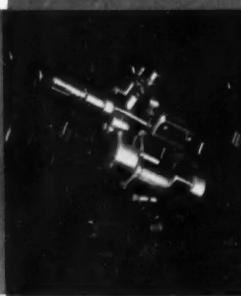
*Pleasurable*

"HYDRAGUIDE" takes the  
work out of driving — restores  
the pleasure.

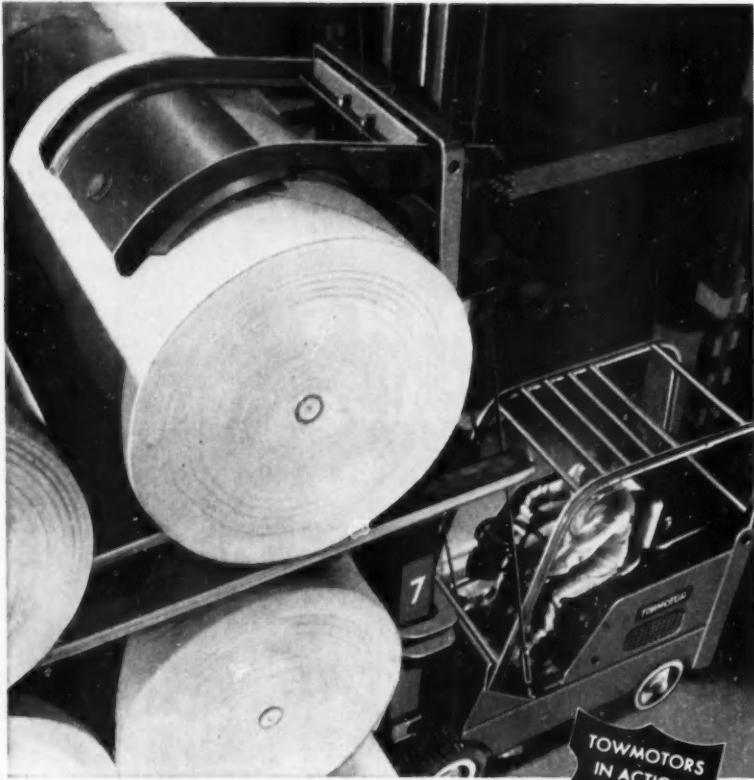
Pioneered by  
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Makers of the Finest  
in Steering

Gemmer Mfg. Co., Detroit 11, Mich.



**INTEGRAL  
AND  
LINKAGE  
TYPES**



Towmotor with Revolving Roll Clamp high-stacks 1½-ton roll of paper at Gibraltar Corrugated Paper Co., Inc.

## Keep UPKEEP Down!

Towmotor often doubles storage space . . . speeds production . . . loads and unloads three and four times faster—with greater savings, because Towmotor helps you keep upkeep down by handling more tons per dollar! That's the kind of performance that counts with the man who signs your pay check.

Your operators will welcome TowmoTorque, the drive that eliminates shifting. And Power Steering that does 80% of the work. And the new "Cushioned Power" Diesels that give new power and economy. Plus many other Towmotor features that help keep upkeep down. Send today for book on TowmoTorque and Power Steering. **TOWMOTOR CORPORATION, Div. 4512, 1226 East 152nd Street, Cleveland 10, Ohio.**



### FORK LIFT TRUCKS and TRACTORS

Since 1919

**TOWMOTOR ENGINEERED FOR QUALITY PERFORMANCE**

## More Defense Contract Awards

THIS latest list of defense prime contracts that have been awarded covers the period from October 28, 1953, to November 23, 1953. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, airplanes, automotive components and spare parts, automotive maintenance equipment, etc.

### — A —

**The Aerotec Corp., Greenwich, Conn.**

Pressure switch—Various—\$65,989

**Aircooled Motors, Inc., Syracuse, New York**

Aircraft engines—30 ea, 16 ea, 2 ea  
—\$119,648

**Airesearch Mig. Co., Div. of Garrett Corp., Los Angeles, Calif.**

Actuator—260 ea—\$54,499

Oil cooler—269 ea—\$82,180

Thermostat, turbine, oil cooler, exchanger—Various—\$60,707

Refrigeration unit and supercharger—Various—\$65,215

Turbine assy—397 ea—\$233,238

**American Chain and Cable Co., Inc., York, Pa.**

Redesign bomb truck—\$31,500

**Atlas Precision Products Co., Philadelphia, Pa.**

Machine tools for the production of gears—Job—\$112,700

### — B —

**The B. G. Corp., New York, N. Y.**

Spark plugs—165,200 ea—\$199,066

**Baldwin-Lima-Hamilton Corp., Lima, Ohio**

Spare parts—Various—\$54,381

**Bendix Aviation Corp., Bendix Products Div., South Bend, Indiana**

Maintenance parts—Various—\$28,151

Engine parts—Various—\$81,229

Overhaul jet engine accessories—Various—\$758,500

Carburetor assy—515 ea—\$534,884

Parts—Various—\$43,041

Parts—Various—\$290,377

Modification kit & spare parts—789 ea—\$173,510

Carburetor—30 ea—\$40,211

**Bendix Aviation Corp., Eclipse-Pioneer Div., Teterboro, N. J.**

Adapter—Various—\$27,310

Test equipment—Various—\$43,009

Bearing—8800 ea—\$28,424

**Bendix Aviation Corp., Pacific Div., North Hollywood, Calif.**

Maintenance parts—Various—

\$1,131,911

(Turn to page 139, please)



*In this new publication you'll find photos and descriptions of typical installations, cut-away views of the furnaces, description of the control instruments, and complete specifications for various sizes of furnaces, work baskets and trays.*

## Brand New Tempering Ideas!

As you're reading this ad our entirely new 20-page catalog will be just off press. It tells graphically of some of the remarkable operating results being obtained in hundreds of plants by users of Homo furnaces.

Today, Homo furnaces are being used under practically every kind of operating condition . . . to meet practically every kind of specification . . . on practically every type of work . . . steel, aluminum or glass. There's a wealth of first-hand data available to you.

If your plant does tempering, at any stage of production, we believe you'll be interested in this

up-to-date information about the highly versatile Homo method . . . the five kinds of Homo furnaces and the jobs they're built to do.

We'll send your copy as soon as you request it. Just write our nearest office or 4966 Stenton Ave., Philadelphia 44, Pa. and ask for Catalog TD2-625(1).

**LEEDS**  **NORTHRUP**  
instruments      automatic controls • furnaces

To users of phosphate coatings,  
Pennsalt offers the

New

# FOSBOND

A complete system linking together supplies and operations . . .

a complete set of compounds...

for cleaning, pickling, phosphating, and rinsing . . .  
all from one reliable source—Pennsalt

applied in a balanced cycle...

tailor-made by Pennsalt engineers to fit your  
operations and equipment

serviced and maintained...

by experienced field servicemen on a  
regular, scheduled basis

advertised and merchandised

to help pre-sell your quality finish  
to wholesalers, dealers, and consumers

At Pennsalt's famous White-mash Research Laboratories, where Fosbond was developed, there are unusually fine testing facilities at the disposal of manufacturers using the Process.



# Process

for trouble-free processing . . . for a better, longer-lasting finish

Now Pennsalt, long a pioneer in the metal processing field, offers everything you need for uniform, trouble-free phosphating of steel and zinc!

Products and processing have been engineered to (1) provide an excellent pre-paint corrosion resistant surface, (2) offer simplified operation through the entire balanced cycle, (3) be usable with standard equipment, and be compatible with standard organic finishes.

Every product and technique now offered has been fully field-tested for two years or more. Experienced Pennsalt specialists are ready to come into your plant to show you how to get the most from this advanced system. Furthermore, once the cycle has been introduced in your plant, these men will continue to help you maintain a trouble-free system.

There is no fee for the Process. Reasonably priced chemical products are your only expense.

#### How's this for proof?

To prove what we say about the Fosbond Process, we offer this service: tell us (1) type of metal to be coated, (2) kind of phosphate coating now used, (3) method of application to be used, (4) kind of organic finish to be employed, and (5) conditions which finish must meet. In turn, we will supply either panels coated by means of the Fosbond Process, or Fosbond chemicals for your use in preparing panels. Then, subject these panels to whatever tests you wish . . . and *you* be the judge.

Which of your products and operations can benefit from the Fosbond Process? Give us details on these items; we'll be able to answer your questions more specifically. Write to Metal Processing Department, 418 Widener Building, Philadelphia 7, Pa.



A better start  
for your finish

Pennsalt  
Chemicals

PENNSYLVANIA SALT MANUFACTURING COMPANY

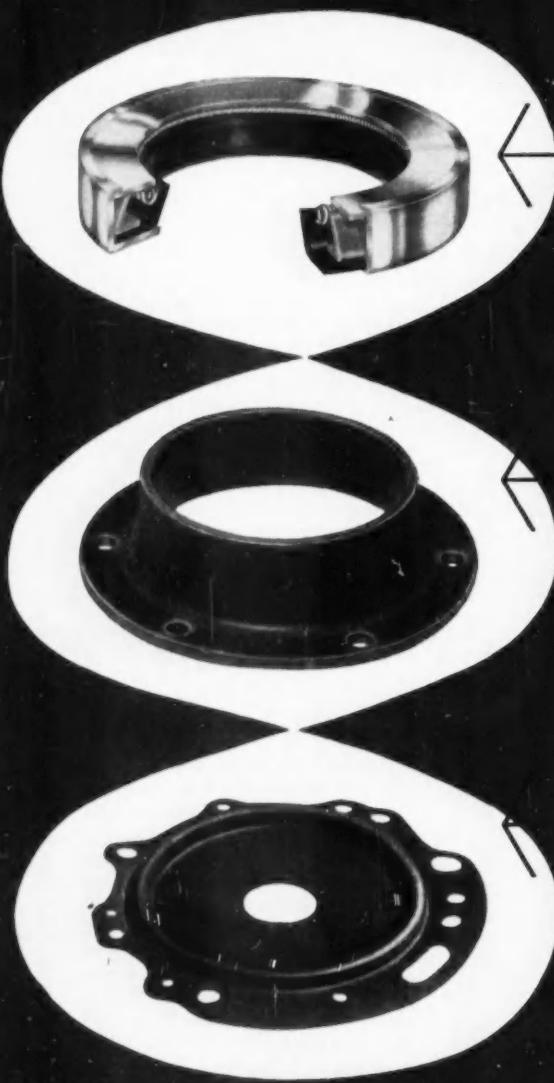
AUTOMOTIVE INDUSTRIES, December 15, 1953

#### A Valuable Fosbond Extra!

The Fosbond Process has received the famous *Good Housekeeping Guaranty Seal*. Manufacturers who qualify may affix to their products the colorful Fosbond emblem which incorporates the Good Housekeeping seal. To help Fosbond users get full advantage from this merchandising "plus", the Fosbond story is told in *The Saturday Evening Post*, *Good Housekeeping*, *U.S. News & World Report*, *Business Week*, *Electrical Merchandising*, *Department Store Economist*, *Implement & Tractor*, and *Office Appliances*.

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Chicago Rawhide for a  
reliable solution  
when your problem  
is one of fluid sealing  
and mechanism protection



## C/R Oil Seals

The "Perfect" answer to fluid retention, moisture and foreign matter exclusion, and similar mechanism protection problems. More C/R oil seals are used in motor vehicles, industrial machines, farm implements and road machinery than any other similar device. Stocked in over 1800 sizes, covering 16 different types.

Write for  
"Engineering with C/R Oil Seals"

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MECHANICAL LEATHER PRODUCTS

Sirvis packings require less replacement than any other type—by actual test. C/R offers a complete line of cup, flange, U and V types from specially treated and tanned steerhide. Available in special designs, scientifically engineered to solve unusual situations. Sirvis packings reduce production costs.

Write for  
Sirvis Mechanical Leather Catalog

## SIRVENE

SCIENTIFICALLY COMPOUNDED ELASTOMERS

(Synthetic Rubber)

When you need an oil-resistant, pliable part with an exact degree of flexibility, hardness, resistance to extreme temperatures, fluids, gases, abrasions and wear . . . whether it be an intricately designed diaphragm or boot . . . or a simple but critical packing or gasket . . . Sirvene is your answer.

Write for  
"Engineering with Sirvene"



(Continued from page 134)

**Bendix Aviation Corp., Red Bank Div., Eatontown, N. J.**

Spare parts—947—\$746,520

**Bendix Aviation Corp., Scintilla Magneto Div., Sidney, New York**

Distributor and ignition harness assys.—Various—\$132,888

Maintenance parts—Various—\$143,044

Maintenance parts—Various—\$138,492

Spare parts—Various—\$167,319

**Brown & Sharpe Mfg. Co., Providence, Rhode Island**

Machine, screw—1 ea—\$22,641

Machine, screw—1 ea—\$11,691

**—C—**

**Caterpillar Tractor Co., Peoria, Ill.**

Motor graders and spart parts—  
Various—\$30,397

**Champion Spark Plug Co., Toledo, Ohio**

Spark plugs—Various—\$63,071

**Consolidated Industries, Inc., West Cheshire, Conn.**

Machine tools for forging—\$193,480

**Consolidated-Vultee Aircraft Corp., San Diego, Calif.**

Machine tools & other capital equipment—\$3,918,119

**Continental Aviation & Engineering Corp., Detroit, Mich.**

Develop and build air cooled engines—Job—\$350,418

**Continental Motors Corp., Detroit, Mich.**

Engines & spare parts—\$30,635

**Continental Motors Corp., Muskegon, Mich.**

Engines—177—\$745,081

Engine assembly—47 ea—\$27,506

**C. B. Cottrell & Sons Co., Westerly, R. I.**

Machine tools and production equipment—\$147,600

**Curtiss-Wright Corp., Wright Aeronautical Div., Woodridge, N. J.**

Shield assy.—460 ea—\$158,268

**—D—**

**Daco Machine & Tool Co., Brooklyn, N. Y.**

Relay assys.—200—\$344,088

Indicators—200

Transmitters—300

Spare parts

**Douglas Aircraft Co., El Segundo, Calif.**

Parts—Various—\$41,958

Maintenance parts—Various—\$383,336

**Douglas Aircraft Co., Inc., Santa Monica, Calif.**

Maintenance parts—Various—\$38,596

Maintenance parts—Various—\$96,166

**—E—**

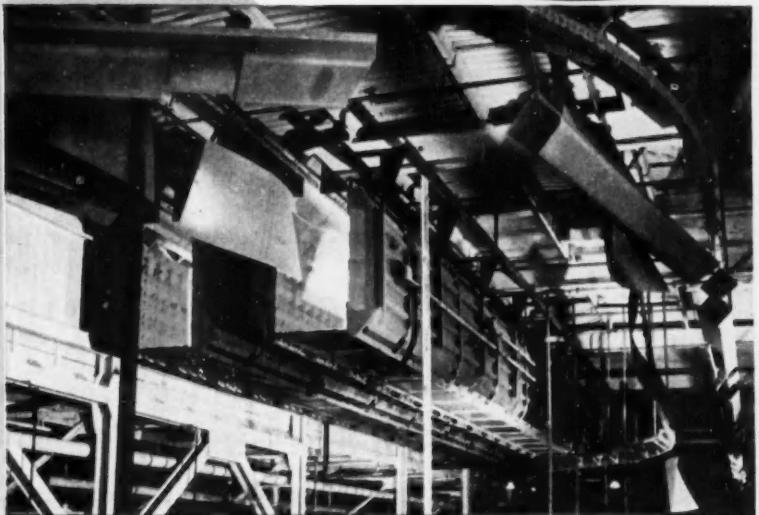
**Electrical Engr. & Mfg. Corp., Los Angeles, Calif.**

Motors for various aircraft—134 ea—  
\$37,058

(Turn to page 140, please)

**ANYTHING THAT  
CAN BE BAKED CAN BE  
BAKED BETTER  
IN A FOSTORIA  
OVEN**

**—ANY SHAPE  
—ANY MATERIAL  
—ANY COLOR**



**A TYPICAL EXAMPLE  
OF ADVANTAGES  
PROVED IN OVER  
7,000 PLANTS**

White Motor Co., Cleveland, Ohio, uses Fostoria Ovens practically 100%. Photo shows two 75-ft. ceiling suspended ovens for finish baking approximately 8,000 parts of various shapes, sizes and colors. Baking time is 5 minutes compared to 20 minutes with other systems. Quality is better controlled. Production economies permit amortization of entire oven investment in less than 2 years.

Throughout industry, new high standards of efficiency are being set by utilization of modern Fostoria oven equipment. A Fostoria representative will gladly analyze your production needs and submit recommendations for your consideration.

Big dividends can be yours by modernizing with Fostoria — America's Finest Engineered Ovens. Case history experience of over 7,000 installations proves (1) no other oven approaches Fostoria results in the high percentage of energy usefully utilized; (2) no other oven compares with Fostoria in production per square foot of floor space; (3) no other oven can match the quality of output or the low "per-piece-cost" of the high efficiency Fostoria Oven. For any product — any shape — any material — any color — a better baking job can be done faster and in less space with the production-proved, modern Fostoria oven. Write now for complete facts.

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FOSTORIA, OHIO, Dept. I**

Please send me information on Fostoria Ovens  
for \_\_\_\_\_

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Company \_\_\_\_\_

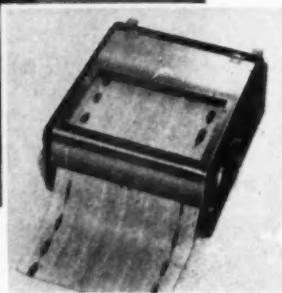
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fostoria  
OVENS**



**NEW!**



## **PORTABLE 6-Channel Oscilloscope Simplifies on the Job Tests**

Now you can easily make multi-channel recordings of electrical or mechanical phenomena in the shop or in the field. This new Brush Oscilloscope is lightweight, self-contained, and can be set up readily.

A large window in the top of the instrument permits viewing the chart as six channels are being recorded. Controls provide chart speeds of 5, 25, and 125 mm. per second. The Oscilloscope includes a 25-foot length of cable and a junction box providing for all necessary amplifier outlets.

Additional flexibility is provided by a remote control box which is offered as an accessory. With this, the operator can start and stop the chart drive from remote locations. A foot switch can be connected to the Oscilloscope or to the remote control station if desired.

Get all the facts on this new Model BL-226 Oscilloscope. For bulletin write Brush Electronics Company, Dept. DD-12, 3405 Perkins Avenue, Cleveland 14, Ohio. Brush representatives are located throughout the U.S. In Canada: A. C. Wickman, Limited, Toronto.



**PIEZOTRONICS**... Brush has prepared this informative 24-page brochure describing the functions and applications of piezo-electric materials. Write for free copy—it may spark a product improvement idea.

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PIEZOELECTRIC MATERIALS • ACOUSTIC DEVICES  
MAGNETIC RECORDING EQUIPMENT  
ULTRASONIC EQUIPMENT



**COMPANY**

*formerly*  
The Brush Development Co.  
Brush Electronics Company  
is an operating unit of  
Clevite Corporation.

(Continued from page 139)

Gear box—53 ea—\$41,511  
**Erie Manufacturing Co., Milwaukee, Wisconsin**  
Cylinder assy.—3415 ea—\$63,621

### **— F —**

**Fargo Motor Corp., Washington, D. C.**  
Trucks—6 ea—\$14,525  
**Fairchild Engine & Airplane Corp., Stratos Div., L. I., N. Y.**  
Services and material to overhaul cooling packages—Various—  
\$188,778  
Valve assy.—171 ea—\$118,845  
**Ford Motor Company, Ford Division, Washington, D. C.**  
Automobiles—49 ea—\$69,140

**Frazier-Wright Co., Los Angeles, Calif.**  
100 K.W. and 200 K.W. DED generator sets; spare parts and tools—15 ea—  
\$254,300

### **— G —**

**General Electric Co., Philadelphia, Pa.**  
Indicator tachometer—1533 ea—  
\$148,088  
Generator—99 ea—\$36,314  
Maintenance parts—323 ea—\$55,680  
**General Motors Corp., Allison Div., Indianapolis, Indiana**  
Spare parts—\$1,832,479  
**General Motors Corp., Chevrolet Motors Div., Detroit, Mich.**  
Automobiles—12 ea—\$17,464  
**General Motors Corp., Fisher Body Div., Detroit, Mich.**  
Parts for processing combat vehicles—  
\$150,000

**General Motors Corp., Technical Center, Warren, Mich.**  
Track and suspension development program—\$710,599  
**The B. F. Goodrich Co., Akron, Ohio**  
Wheel assys. and abrasive type shoe  
Various—\$53,091  
**The Goodyear Tire & Rubber Co., Inc., Akron, Ohio**

Brake lining—223,140 ea—\$34,473  
Hose—Various—\$58,370

**Gray Marine Motor Co., Detroit, Mich.**  
100 HP Diesel engine—210—\$720,937  
100 HP Diesel engine—16—\$63,840  
100 HP Diesel engine—67—\$229,664

### **— H —**

**Hall-Scott Motor Div., Berkeley, Calif.**  
Spare parts—Various—\$26,834  
**Hoover Electric Co., Los Angeles, Calif.**  
Motor—119 ea—\$25,317  
**Houdaille-Hershey Corp., Detroit, Michigan**  
Shimmy damper—51 ea—\$48,816

### **— L —**

**R. G. LeTourneau, Inc., Longview, Texas**  
Mobile airplane crash truck—2—  
\$79,798  
(Turn to page 142, please)

ENGINE BUILDERS  
CUT THE COST OF

# chrome plated oil rings

IN A DOLLAR

The new Muskegon 3000-200 is a brand new multiple piece ring that combines the advantages of chrome plating and "Unitizing".

By utilizing unique methods, Muskegon engineers have a ring that fits like a single chrome plated ring. Eliminating costly chrome plating, the cost per ring is reduced by 50%. Friction is reduced by 30%.

"Unitizing" provides Muskegon's unique method of joining the rails together with special adhesive which allows assembly during engine run.

Engineers have been working on your assembly difficulties for one year.

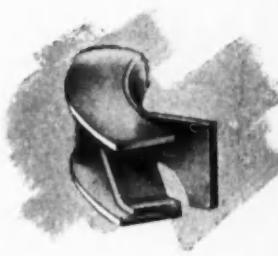
Multiple pieces handle like a one-piece ring. Rails and spacer are correctly assembled and "Unitized" with adhesive cement.



Multiple pieces handle like a one-piece ring. Rails and spacer are correctly assembled and "Unitized" with adhesive cement.



Adhesive disappears during first engine run. Pieces separate to conform to cylinder contours.



Heavy duty expander assures perfect fit. Tight seal conserves oil, increases engine efficiency.

MUSKEGON  
Piston Rings

MUSKEGON PISTON RING CO.  
MUSKEGON, MICHIGAN  
PLANTS AT MUSKEGON AND SPARTA

DETROIT OFFICE: 521 New Center Bldg., Telephone Trinity 2-2113

(Continued from page 140)

LeTourneau-Westinghouse Co., Peoria, Ill.

Motor graders and spare parts—  
Various—\$195,075

— M —

The W. L. Maxson Corp., New York,  
N. Y.

Spare parts—Various—\$101,479

Minneapolis-Honeywell Regulator Co.,  
Aeronautical Div., Minneapolis,  
Minn.

Indicators—173 ea—\$40,972

Amplifier assy—683 ea—\$35,086

— N —

The National Acme Co., Cleveland,  
Ohio

8 spindle automatic bar machine—3  
—\$127,036

The New York Air Brake Co., New York,  
N. Y.

Hydraulic pumps—164 ea—\$126,870

Niles-Bement-Pond Company, Chandler-  
Evans Div., W. Hartford, Conn.

Fuel pumps—231—\$30,199

— O —

The Oliver Corp., A. B. Farquhar Div.,  
York, Pa.

Facilities to produce 106MM recoilless  
rifle—Various—\$656,453

D. W. Onan & Sons, Inc., Minneapolis,  
Minn.

Spare parts—2 lots—\$36,852

— P —

Pacific Airmotive Corp., Burbank, Calif.

Valve assy—422 ea—\$274,300

Parker Aircraft Co., Los Angeles, Calif.

Maintenance parts—10,377 ea—\$39,951

— R —

Reo Washington Co., Inc., Washington,  
D. C.

Trucks—2 ea—\$11,865

Ryan Aeronautical Co., San Diego,  
Calif.

Spare parts—1 lot—\$77,016

— S —

The Sheffield Corp., Dayton, Ohio  
Gages—67 ea—\$67,815

Sperry Gyroscope Co., Div. of Sperry  
Corp., Great Neck, N. Y.

Bearings—82,000 ea—\$133,660

Bearings—16,000 ea—\$40,480

Bearings—Various—\$38,354

Sprague Engr. & Sales Corp., Gardena,  
Calif.

Accumulator assy—Various—\$187,022

Stewart & Stevenson Services, Dallas,  
Texas

Diesel generator sets—Est.—\$647,853

— T —

Thompson Products, Inc., Cleveland,  
Ohio

Fuel pump assy—Various—\$362,520

— U —

United Aircraft Corp., Hamilton Stand-  
ard Div., Windsor Locks, Conn.

Spare parts—Various—\$131,929

Material—Various—\$43,439

Material—Various—\$150,354

Material—Various—\$53,801

Spare parts—Various—\$84,182

Propeller assy—Various—\$756,913

Pump assembly—1223 ea—\$104,016

United Aircraft Corp., Pratt & Whitney  
Aircraft Div., E. Hartford, Conn.

Special tools—\$800,000

Spare parts—Various—\$306,599

Control—25 ea—\$41,998

Pump fuel—75 ea—\$101,969

Control—82 ea—\$417,134

Spare parts—Various—\$54,274

Material—Various—\$1,297,691

Spare parts—Various—\$56,312

Material—Various—\$128,613

Spare parts—Various—\$43,437

Material—Various—\$432,783

Fuel pump AF MIPR—20 ea—\$32,160

Spare parts—Various—\$67,876

(Turn to page 156, please)

**Chicago RIVET "912"**  
AUTOMATIC RIVET SETTER  
CUTS COSTS 3 WAYS

**1 FASTENS FASTER . . .**  
Only the speed of the operator limits the 912's riveting speed. Completely automatic. A push on the foot pedal automatically feeds, inserts and clinches the rivet.

**2 DOES WORK OF SEVERAL MACHINES**  
Quick change rotary hopper and race-way makes the 912 adjustable in 5 to 10 minutes to set different size rivets. Adjustable anvil height and 12-inch throat provide further versatility.

**3 SAVES ON MAINTENANCE . . .**  
The 912 is massively built to stand the shocks of constant use and is designed for quick, easy servicing and parts replacement. If your assembly calls for 3/16" steel tubular rivets or smaller, of 15/16" lengths or less, ask us to show you how the 912 can cut your fastening costs. Send a sample of your problem assembly (or blueprint) for a free fastening analysis.

**FREE CATALOG**  
contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.

**Chicago Rivet & MACHINE CO.**  
9612 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois  
Branch Factory: Tyrone, Pa.

**SIGN OF SUPERIORITY  
SYMBOL OF SINCERITY**



**THE SEASON'S SINCEREST GREETINGS TO AMERICA'S GREAT INDUSTRIES**

**L. A. YOUNG SPRING & WIRE CORPORATION • Main Offices: 9200 Russell Street, Detroit 11, Mich.**

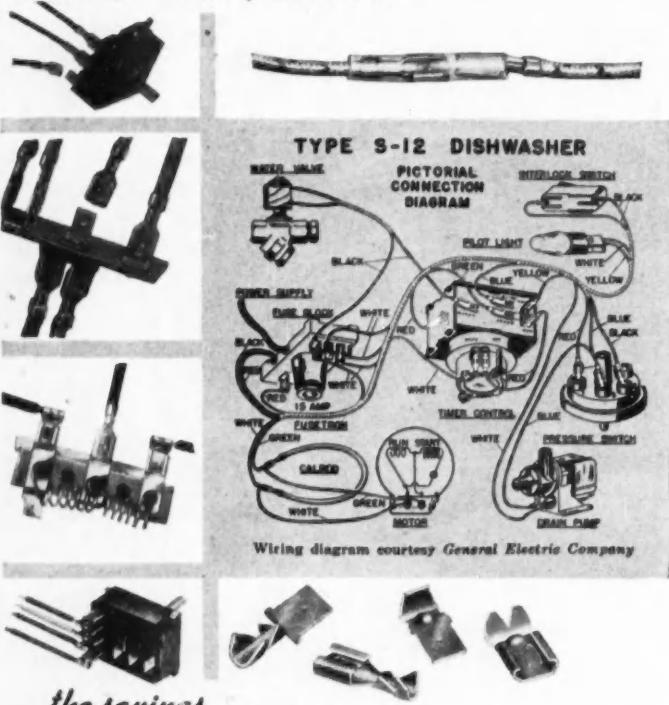


## **this ARK-LES idea**

**is saving millions in the electrical appliance  
and automotive industries.**

### **the idea**

Back in 1937, the Ark-Les Switch Corporation pioneered the development of a low-cost, fast-assembly, mechanically secure method of wiring electrical systems. The result was the Ark-Les QUICK-CONNECT terminal—first patented in 1943.



### **the savings**

Production men report Ark-Les QUICK-CONNECT terminals cut wiring time up to 60% in assembling ranges, refrigerators, water heaters, panel boards, and all kinds of electric and automotive apparatus. Your own time-study figures will prove the savings realized in eliminating screw connections in the General Electric dish washer diagrammed above.

### **acceptance**

of this money-saving idea is proved by the fact that "QUICK-CONNECT"—in various spellings—is now the standard term for the fastest wiring method. Manufacturers all over the country now incorporate these simple, safe, economical connections in their products—some under license from Ark-Les, and some in frank and successful imitation.

The engineering imagination that originated the "QUICK-CONNECT" terminal can cut your wiring costs. For details, write to the originators . . .



**ARK-LES SWITCH CORP.**  
51 Water St., Watertown 72, Mass.

## **AIRBRIEFS**

(Continued from page 82)

### **U. S. Air Power**

Navy Assistant Secretary James H. Smith, Jr., has compiled the latest statistics on U. S. Air Power which reveal that the U. S. now has 39,936 military and 52,643 civil aircraft in operation, a grand total of 92,579 airplanes. This revelation offers decisive rebuttal to critics who have warned that Russia has 40,000 airplanes in its Red Air Force. If this is so, we are only 64 airplanes behind them. Smith says that 19,091 students, both military and civil, enter flight training schools annually and 58,008 men are graduated each year from overhaul and maintenance courses. The U. S. has 908 airports in operation within its continental limits plus 135 others overseas, representing an investment of \$11.5 billion.

### **International Headache**

The Air Force is finding itself knee-deep in another Kaiser-type aircraft procurement problem which Congress is certain to question closely next January. Last May the Fiat Aircraft Co. in Turin, Italy was getting ready to close its doors for lack of work. Fiat is the only major aircraft company in Italy with a reservoir of skilled aircraft engineers and shop workers and its bankruptcy would have dissipated this asset to NATO. To save the situation, the Air Force, through NATO, placed a quantity production order with Fiat for output of the North American F-86D all-weather interceptor. After many delays and costly decisions regarding new equipment, training programs, etc., Fiat is now getting into production on the F-86D. However, the Air Force now estimates that the airplanes, as delivered to the USAF, will cost about \$1 million each. At the moment, the Air Force is receiving the same airplane from North American in California for less than \$400,000 each. Congress is going to ask the obvious question as to why the Air Force didn't just buy the airplanes from North American and the answer to that one is going to be interesting.

### **First U. S. Jet Transport**

First details on the Boeing 707 jet transport, scheduled to fly next July, have become available and reveal it (Turn to page 147, please)

STAINLESS STEEL FOR BUILDINGS

# McLouth STAINLESS Steel

For the product you make  
today and the product you  
plan for tomorrow.



**McLOUTH STEEL CORPORATION**  
**DETROIT, MICHIGAN**

*Manufacturers of Stainless and Carbon Steels*



#### Engineering consultation

Janitrol design engineers collaborate with the aircraft manufacturer in the field, and at home to develop simple, trouble-free, weight and space-saving heating installations.



#### Service training

Field office personnel organize and conduct operator service training programs on new installations and new equipment—often assist in establishing maintenance and overhaul programs, and facilities.

## HERE'S HOW **JANITROL "SERVICE TEAMS" PINPOINT SERVICE NEEDS EVERYWHERE!**



#### Service testing

Janitrol engineers log hundreds of air hours each year as a continuing part of this program. Service qualification testing, using the most modern facilities, supported by experienced planning, all functions of skilled Janitrol service teams.



#### Aircraft Heating Digest

A quarterly publication of authoritative aircraft heating equipment service, design, installation, and trouble-shooting articles especially prepared for aircraft engineering and service personnel. A subscription is yours, free for the asking.

The continuing basic research programs conducted by stay-at-home Janitrol engineers rounds out the "team" that provides more *right answers* to aircraft heating problems. Whether your problem is heat for aircraft, ground equipment or standby needs, get Janitrol in at the design stage, and you'll get the job done quicker.



AIRCRAFT-AUTOMOTIVE DIVISION, SURFACE COMBUSTION CORPORATION, TOLEDO 1, OHIO

National Sales, Engineering, Production Headquarters, 400 Dublin Ave., Columbus 16, Ohio. District Engineering Offices: New York, 225 Broadway, Washington, D. C., 4650 East-West Highway; Kansas City, 2201 Grand Ave.; Ft. Worth, 2509 West Berry St.; Hollywood, Calif., 7046 Hollywood Blvd.; Columbus, Ohio, 400 Dublin Ave. Executive Offices: 2375 Dorr St., Toledo 1, Ohio.

# Janitrol

## AIRBRIEFS

(Continued from page 144)

to be a surprisingly large airplane. The new jet will have a wing span of 130 ft and a length of 127 ft, 10 in. It will have a gross weight of 190,000 lb, making it easily the heaviest airliner ever built in this country. It will accommodate 80 passengers in a deluxe version or 121 in an air coach arrangement. It will cruise at about 500 mph for a maximum range of 2800 miles, enough for trans-Atlantic service. It will carry 13,680 gal of fuel which will weigh 88,920 lb. The 797 will be powered by four Pratt & Whitney J57 turbojet engines producing 10,000 lb of thrust each, these engines being mounted in individual pods slung beneath the wing at intervals. Air Force is said to be extremely interested in the 707 as a high speed jet tanker for refueling jet bombers and fighters in flight. Present tankers force jets to slow down to minimum airspeed for fueling contacts.

### Industry Expansion

Latest statistics from Bureau of the Census indicate that the aircraft manufacturing industry held \$2,288,377,000 inventory in the form of materials, supplies and work in process plus \$113,968,000 in finished products at the end of 1952. Total investment in plant and equipment made during 1952 was \$203,185,000. Of this total, \$125,246,000 was spent on new buildings and plant additions and \$77,939,000 was spent on new machinery and equipment. These data reflect a quadruple increase in inventory and an eight-time increase in capital investment over 1947.

### National Economy

The National Planning Association, in a special study of the ability of the Nation to support an expanded defense program, believes that the economy could withstand a defense budget as high as \$75 billion without the danger of collapse. NPA says that under a \$75 billion budget, the Air Force would receive an additional billion the first year, \$5 billion the second year and \$10 billion the third year above its present program. The NPA program calls for expenditure of the major portion of these additional funds for Air Defense—radar screen, guided missiles and interceptors—rather than strategic bombers. Commenting on a possible \$75 billion defense budget, NPA expresses doubt

that the military could spend such huge sums within a three year period through inability of industry to absorb the work load. At any rate, the study indicates that the present level of military spending of about \$55 billion involves no strain or hardship on the national economy and should not, therefore, be considered a serious factor in projecting future defense plans, as has been advanced in several quarters.

## BOOKS ...

LICENSING AND EXCHANGE CONTROL REQUIREMENTS, published by Office of International Trade, U. S. Department of Commerce, Washington 25, D. C. Price, \$0.50. This 42-page booklet contains summary information on import and export licensing and exchange control requirements in continental European countries as of August 1, 1953.



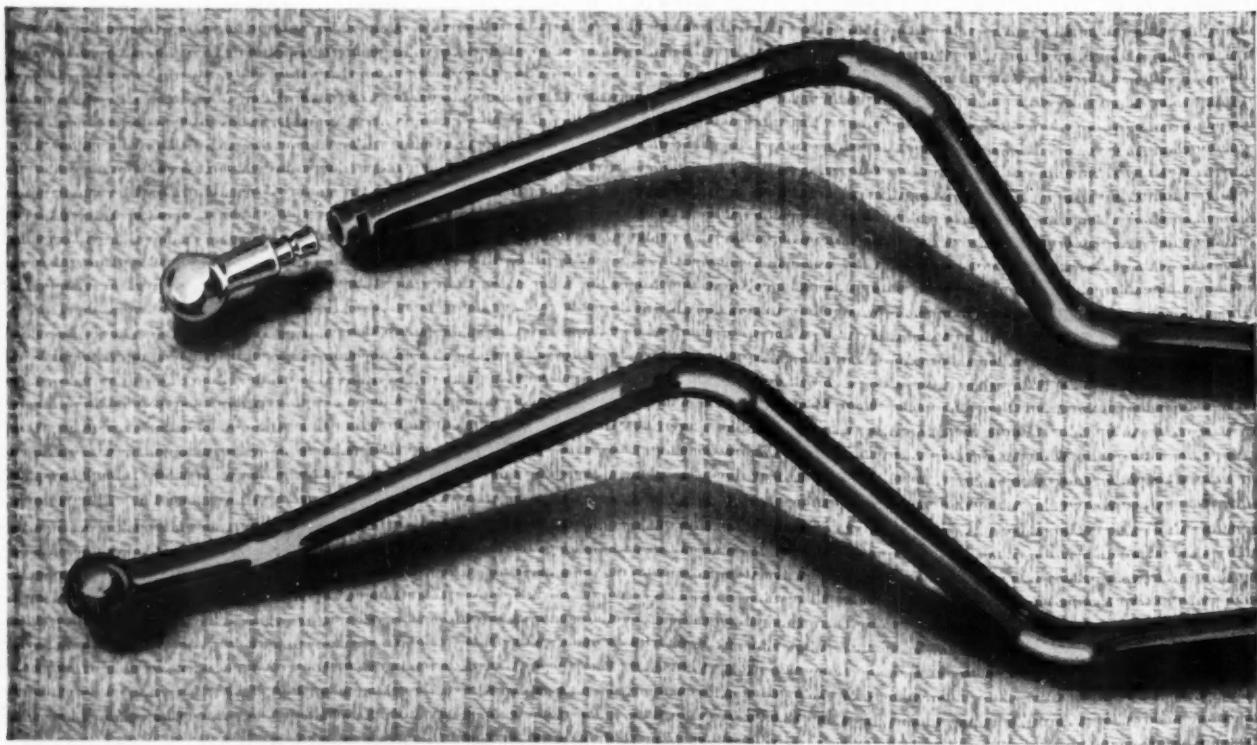
• In Flexon Thermostats the engine manufacturer gets a combination that is vital to his operation—a quality product backed by a reputable manufacturer with over 50 years manufacturing experience. Since 1902, Flexonics Corporation has specialized in the manufacture of products that utilize flexible metal elements. Since 1937, Flexonics Corporation has manufactured quality bellows. All the know-how accumulated over these years goes into every Flexon Thermostat. All the experience in meeting customers' specifications and production schedules has developed a policy of complete cooperation to help keep your output flowing smoothly.

We would like to have the opportunity to go over your needs with you and show you what Flexonics Corporation can do for you. Write, wire or phone to have your Flexonics sales engineer call.

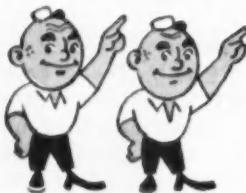
**Flexonics** *Corporation*

FLEXON BELLOWS DIVISION  
1396 S. THIRD AVENUE • MAYWOOD, ILLINOIS  
FORMERLY CHICAGO METAL HOSE CORPORATION  
Manufacturers of flexible metal hose and conduit, expansion joints, metallic bellows and assemblies of these components.  
In Canada: Flexonics Corporation of Canada, Ltd., Brampton, Ontario





# Three-piece accelerator rod simplified to one piece of Bundyweld Tubing



Bundyweld starts as a single strip of copper-coated steel. Then it's . . .



continuously rolled twice around laterally into a tube of uniform thickness, and



passed through a furnace. Copper coating fuses with steel. Result . . .



Bundyweld, double-walled and brazed through 360° of wall contact.



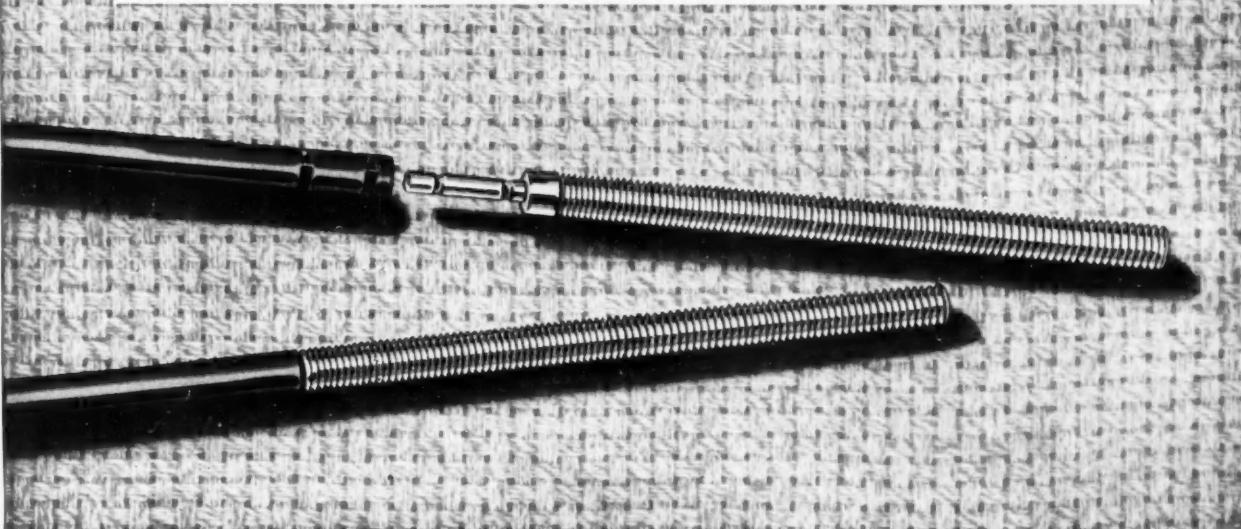
**SIZES UP  
TO  $\frac{3}{8}$ " O.D.**

NOTE the exclusive Bundy - developed beveled edges, which afford a smoother joint, absence of bead and less chance for any leakage.

**WHY BUNDYWELD IS BETTER TUBING**

Bundy Tubing Distributors and Representatives: Cambridge 42, Mass.: Austin-Hastings Co., Inc., 226 Binney St. • Chattanooga 2, Tenn.: Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. • Chicago 32, Ill.: Lapham-Hickey Co., 3333 47th Place • Elizabeth, New Jersey: A. B. Murray Co., Inc., Post Office Box 476 • Philadelphia 3, Penn.: Rutan & Co., 1717 Sansom St. • San Francisco 10, Calif.: Pacific Metals Co., Ltd., 3100 19th St. • Seattle 4, Wash.: Eagle Metals Co., 4735 First Ave., South • Toronto 5, Ontario, Canada: Alloy Metal Sales, Ltd., 181 Fleet St., East. • Bridgeport, Conn.: Korhumel Steel & Aluminum Co., 117 E. Washington St. • Los Angeles 58, Calif.: Tubesales, 5400 Alcoa Ave. Bundyweld nickel and Monel tubing is sold by distributors of nickel and nickel alloys in principal cities.

**Vigilance of Bundy engineers** resulted in redesign of three-piece accelerator rod (top) to one-piece unit made entirely of Bundyweld (bottom). Part quality was improved, cost lowered. Can we help you, too?



**A Bundy customer's accelerator-rod** design called for a threaded rod and a ball-end to be mechanically held in opposite ends of a piece of formed  $\frac{1}{4}$ " O.D. Bundyweld Tubing.

While we produced the rod according to specifications, our engineers took a good hard look at the part. They soon came up with a simple, sound idea to produce a stronger, more durable part at less cost to our customer.

You see the result above—a one-piece accelerator rod of Bundyweld Tubing threaded on one end, expanded and formed into a ball at the other. Perhaps you can see

several factors that will work to your advantage, too.

**Take Bundyweld** itself, for instance. It's the automotive industry's standard of dependability. It's the only tubing double-walled from a single strip, copper-bonded throughout  $360^{\circ}$  of wall contact. It has high tensile strength, high yield strength, high fatigue limit. And, of course, there's almost nothing that it won't take in the way of fabrication beating.

When you hand us the design for a tubing part, we're geared to produce it in volume to your specifications—thanks to Bundyweld and

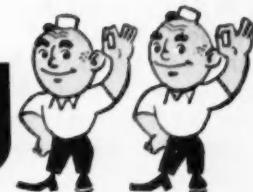
thanks to our skilled men and Bundy-developed bending machines. But if we can suggest a cheaper way of making the part or a way of improving it, or both, we'll speak up. It's our policy to do so. If you're set up to handle your own fabrication operations, however, we'll be glad to ship you clean straight lengths of Bundyweld.

**For an Improved**, lower-cost accelerator rod—or for that matter, for leakproof brake, gasoline, and oil lines, talk things over with a Bundy tubing specialist. Call, write, or wire Bundy Tubing Company, world's largest producer of small-diameter tubing.

BUNDY TUBING COMPANY • DETROIT 14, MICHIGAN

# Bundyweld Tubing<sup>®</sup>

DOUBLE-WALLED FROM A SINGLE STRIP



Look to **T** for sound,  
reliable assistance  
in **RESISTANCE WELDING**  
SPOT • PROJECTION  
SEAM • FLASH-BUTT

**WHEN**  
designing new parts,  
resistance welding is  
the modern, economical  
production method.  
We can help you.

**WHEN**  
setting up a new  
production line, we  
can give you help with  
resistance welding's  
part in retooling.

**WHEN**  
resistance welding  
will improve your  
present setup — we  
have the answers.

**WHEN**  
you need practical  
help, we have appli-  
cation, design and field  
engineers available to  
give you facts, figures  
and the benefit of our  
50 years of experience  
— phone or write  
your nearest district  
sales and service  
office.

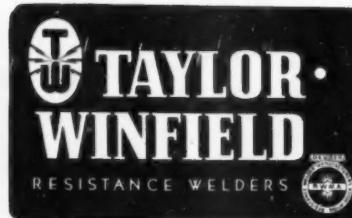


Resistance Welders Since 1898

*Sales and Service*

CHARLOTTE • CHATTANOOGA  
CHICAGO • CLEVELAND • DAYTON  
DENVER • DETROIT • DALLAS  
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DUNDAS, ONTARIO

THE TAYLOR-WINFIELD CORPORATION • WARREN, OHIO



## News of the MACHINERY INDUSTRIES

(Continued from page 63)

mell, Leyland, Dennis and A.E.C. Seven producers of Diesel engines were also included, as were a score of machine tool firms.

The Machine Tool Trades Association has recently advised its members by circular to accept all Chinese orders, then to apply to the Board of Trade for export licenses. Until now, British manufacturers have declined such business in view of the certainty that permits would not be granted.

The MTTA now maintains that European competitors are already shipping machine tools to China, and that the British government should be impressed with the need to revise its strict embargo by the volume of orders which are expected.

At Monarch Machine Tool Co., Sidney, Ohio, a good housekeeping program has been launched which is aimed at keeping the recently enlarged plant in first class order. Management has planned to use the bank-examiner or surprise factor technique to grade each department. Inspection teams made up of two men—one general foreman from each shift—will inspect each of the 19 departments once each week.

Another interesting item stemming from Monarch is that the firm has passed the \$1 million mark in sales of roll turning lathes for the steel industry. Since the first lathe was built four years ago, over \$1 1/4 million worth of lathes have been built and shipped to steel companies in 11 states, and to mills in three foreign countries.

Sundstrand Machine Tool Co., Rockford, Ill., has reported unaudited sales of \$29,562,000 for the first nine months of this year, a 14 per cent increase over a year ago and an all time nine month high. After the usual deductions, net earnings (unaudited) are \$1,393,000 for the first nine months of 1953 as compared with the first three quarters of 1952 which was \$1,466,000.

Jones & Lamson Machine Co., Springfield, Vt., is one company that is really going all out to sell machine tools and provide the best possible customer service. To facilitate travel for sales and engineering personnel, its executives and its customers, the firm has purchased a new Aero Commander airplane. It's a seven-place,



# C-D-F SPIRAL TUBING

A UNIFORM, HIGH QUALITY PRODUCT AT LOW COST

Good dielectric strength • Low dielectric loss properties  
Good mechanical strength and moisture resistance

C-D-F is a dependable source of supply for all of your coil form spiral tubing needs. Uniform, high product quality is maintained by rigid standards of manufacture. C-D-F offers you fabricating skill, backed by exacting technical and inspection control. A recent C-D-F development is Grade 5 Constant Torque Tubing for use in coil forms. After the threaded iron tuning core is inserted and finally adjusted, you obtain the same stable torque rating.

Constant Torque features: exact internal threading . . . every thread engaged. 3-point contact with core prevents binding and permits positive tuning and re-tuning. Outer surface of tube has no weak spots, no external embossing to cause cement leakage. Available in lengths up to 14" to take .248" to .250" core with 28 threads per inch and also 6-32, 8-32 and 10-32 screw sizes. Write for samples.

Grade 5 Tubing is also custom-fabricated by C-D-F in conventional shapes to accommodate other sizes of tuning cores.

C-D-F produces spiral tubing in grades to meet most requirements. Use the Grade Selector Chart when requesting samples and additional information.

## AVAILABLE GRADES

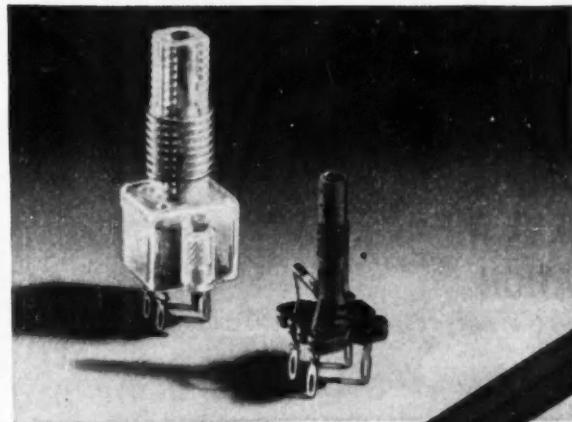
### IMPREGNATED

- 1 General Electrical and Mechanical Grade.
- 1A Electrical and Mechanical Grade—Special Punching.
- 2 Mild Stapling, Riveting, and Post Forming Quality.
- 2A Intermediate Fabricating and Stapling Quality.
- 3 Severe Stapling, Riveting, and Post Forming Quality.
- 5 Constant Torque and Formed-to-Shape Coil Form Tubing.
- 6 Special for High Humidity Applications.
- 6A Extra Hard, High Strength Tubing.
- 7 Soft Varnished Kraft Tubing.
- 7A Hard, Rigid Rectangular Tubing.
- 8 Varnished Diamond Insulation-Tubing.
- 9 "Deflection Coil" Tubing.
- 10 Larger Size, Heavy Wall Tubing for Mechanical Uses.

### UNIMPREGNATED

- 20 Special Wound in Specified Combinations of kraft paper, fish paper, etc.
- 21 Plain Kraft Paper Tubing.
- 22 Plain Diamond Insulation Tubing.
- 23 Plain Chipboard Tubing.

Round  
 Formed (fluted shape)   Formed and Notched  
 Square, Rectangular



## SELECTION OF THE PROPER GRADE

While the differences between some of the grades are not great, they are quite distinct when specific requirements are considered. For most uses, the proper grade can be selected from the descriptions, size range, and properties tables in our catalog. If this should prove difficult in some cases, it is desirable for our C-D-F sales engineer to have as much information as possible about the application, especially fabricating requirements, in order that we may make suggestions. Your blueprint is usually sufficient if it carries some indication as to the quality desired. In other cases, the following check list will be found to be helpful:

### Type of Application.

Properties required or the customer's specification for the material. Fabricating quality desired. This is important where stapling, riveting, punching, or forming operations are to be performed by the customer.

Any unusual conditions which may affect the suitability of the material for the job. For tubing that is to accommodate tuning cores, actual samples of the cores are essential along with torque requirements (if known).

Get all the facts. Write for 8-page Technical Folder ST-53 describing standard grades of C-D-F Spiral Tubing, their properties, sizes and tolerances, and how to select the proper grade for your application. Free test samples are available upon request. Call your C-D-F Sales Engineer (offices in principal cities). He's a good man to know!

THE NAME TO REMEMBER SPIRAL TUBING

*Continental-Diamond Fibre Company*

NEWARK 2, DELAWARE

two-engine craft that has a 1000 mile range with a cruising speed of 180 mph. The local airport is supplying two well-experienced standby crews for the plane. J & L points out, "Satisfied customers make good public relations—and those customers continue to come back."

There is a possibility of a merger between Lodge & Shipley Co., Cincinnati, and Columbia Machinery Corp., both machine tool makers. Negotiations are underway.

Since Hydra-Matic Fire I, Gisholt's sub-contractor—Continental Gin Co.,

Birmingham, Ala.—has been rebuilding No. 12 hydraulic automatic lathes in record time. From burned out hulk to new machine in three weeks is quite an accomplishment, especially after seeing the twisted piece of iron they had to work with.

Pennsylvania Peerless Corp., a recently-organized manufacturer of special machinery, has built a new plant in Pottsville, Pa. According to Peerless management, everything from automatic transfer machines down to single-hydraulic-feed trunnions will be manufactured.

The Bullard Co., Bridgeport, Conn., reports net sales of over \$48½ million for the nine month period ending September. Current backlog of unfilled orders is approximately \$44 million. It is reported that for the first time in several years the backlog is predominately civilian business.

Colonial Broach Co., Detroit, Mich., is adding 6000 sq ft of floor space to its plant. This expansion comes during the company's observance of its 35th anniversary.

Emil Gairing, Inc., is the name of a new firm that will do work in the design and manufacture of cutting tools and allied parts. Emil Gairing will be president of the company which will be located in Detroit.

Gerity-Michigan Corp. has developed a new process for polishing and buffing metals involving moving parts on a conveyor through a wet abrasive mixture, followed by buffing with revolving rubber mats. The rubber buffing mats are said to have unusually long life. Other advantages claimed are reuse of abrasive mixture and absence of dust. The company plans to both license and sell the machines.

Peninsular Grinding Wheel Co. and Motors Metal Manufacturing Co. stockholders will vote January 5, 1954, on a proposal approved by directors of both companies for a merger. The merged company would be known as Abrasive and Metal Products Co. with both principals continuing to operate as divisions. Both concerns are old-line companies, as Peninsular was founded in 1891, and Motors Metal has been in business since 1913.

Utica Drop Forge & Tool Co. has released a sound film on the history of forging, entitled "5000 Years of Forging."

DeWalt Inc., Lancaster, Pa., has formed a new Canadian subsidiary to be known as DeWalt Canada Ltd., Guelph, Ontario.

Kurt Orban Co., New York, N. Y., has appointed the International Machinery Co., New Haven, Conn., sole distributor of its line of German machine tools in Southern New England.

# Burton SPRINGS

SERVE THE NATION



The greatest proving ground for Burton Springs is in the field where they are used under the most demanding circumstances, and under all conditions of terrain, weather, and load. Back from the main highways, where the average citizen never sees them, Burton Springs are helping to clear land, haul timber, level roads and do the heaviest kind of heavy duty work.

Burton's engineering experience and skill pay off under such conditions. Manufacturers, like the White Motor Company, have come to rely upon the performance of Burton Springs. They know Burton can be counted upon every time, for Burton maintains a high standard of quality.

For your own particular spring problem, why not consult with our engineers. They are always ready to assist you.

Why not contact Burton today.

**Put the Burden on Burt Basco**

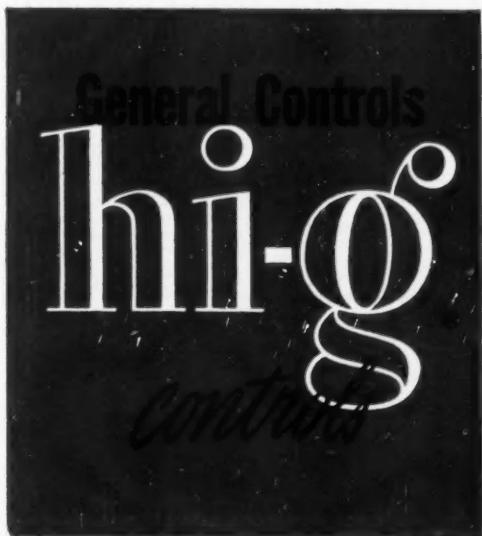
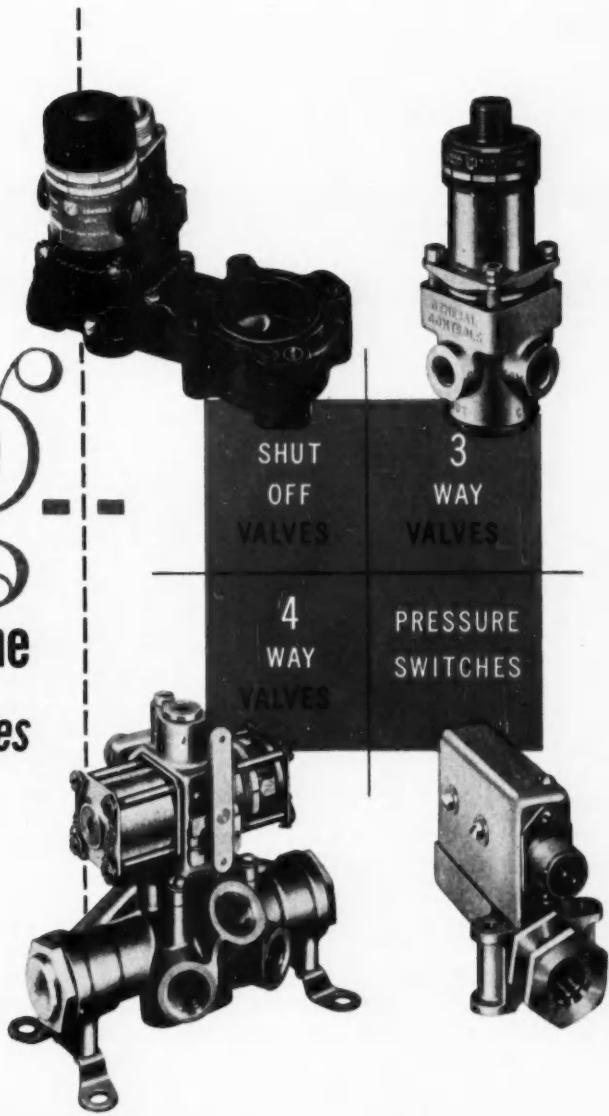
# Burton

**AUTO SPRING CORP.**  
48th ST. at WESTERN AVE.  
Chicago 32, Illinois

## AUTOMOTIVE INDUSTRIES . . .

is your News Magazine of  
Automotive and Aviation  
**MANUFACTURING**

hi-g  
for any machine  
*that rolls, floats, or flies*



In engineering terms "high g" means high gravitation forces. In performance terms "Hi-g" means General Controls' reliable line of automatic pressure, temperature, level and flow controls for heavy duty under acceleration factors from 10 to 300G. The Hi-g line comprises electromagnetic pilot and shutoff valves... manual and motor-driven gate valves... electrohydraulic selector valves... gauge and differential type limit controls... all light in weight, compact in design and trustworthy in operation... handling a great variety of liquids and gases in a wide temperature range. For high efficiency performance under extreme vibration and acceleration conditions it's General Controls Hi-g Controls... the best in automatic control for any machine that rolls, floats or flies.



**GENERAL CONTROLS**

Glendale, California • Skokie, Illinois

Manufacturers of Automatic Pressure, Temperature, Level and Flow Controls for Heating, Home Appliances, Refrigeration, Industrial and Aircraft Applications.

FACTORY BRANCHES IN 35 PRINCIPAL CITIES

See your classified telephone directory.

## Ahead of Schedule! Four million tons a year to

**N**ow completed, right in the heart of the automotive industry, are facilities that increase Great Lakes Steel's annual capacity to *four million ingot tons*. That's about 25% of this industry's annual appetite for steel, and about 40% of its appetite for the kinds of steel we make.

So this growth of Great Lakes Steel—weeks ahead of schedule—means a great deal not only to us but to our principal customer, too.

Our new facilities—new blast furnaces, the new bessemer converters, the new slabbing mill, and the rest—all fit into a program established long ago, when the company was founded. The program called for Great Lakes Steel to provide the automotive industry with a dependable first source of sheet, strip and other shapes for this industry's mammoth needs. And that's just what we've been doing.

We start with the ore, and work it through blast furnaces, bessemers and open hearths, blooming mills, hot and cold rolling mills and merchant mills, right down to the finished forms. This integration of control gives Great Lakes Steel the flexibility and availability that let us give real service.

Not just another steel supplier, Great Lakes is also a *developer* of steels now important to the industry—N-A-X HIGH-TENSILE steels, which combine extra strength, formability, and corrosion-resistance, enabling manufacturers to make improvements in many parts.

You can expect more great things to happen at Great Lakes Steel. For we aim to serve well our many customers in many fields, while keeping pace with the increasing needs of the mighty automotive industry. *Great Lakes Steel Corporation, Detroit 29, Michigan.*

## Great Lakes Steel

NATIONAL STEEL CORPORATION

GREAT THINGS HAPPEN AT GREAT LAKES STEEL

**supply the mighty automotive industry**



*Illustration: New "D" blast furnace, Great Lakes Steel.*

# Travels Over Roughest Ground... **WISCONSIN**-Powered **CARMICHAEL** **SPEED LIFT**

Those big rubber-tired wheels up front are there for a reason. Wheels permit fast handling over rough ground, also help relieve weight strain on weak floors. Carmichael Speed Lift is built by Texas Metal and Mfg. Co., Inc., Dallas, Tex., powered by a Wisconsin Heavy-Duty Air-Cooled Engine.

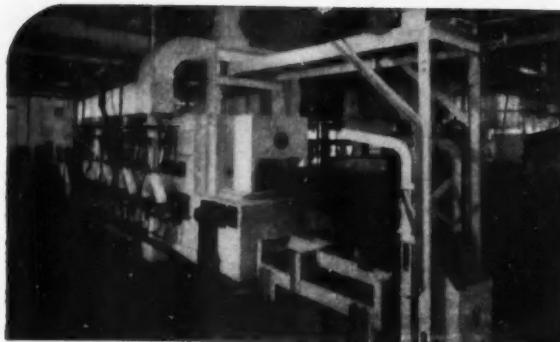
This widespread acceptance in the industrial field is backed by features that contribute to reliability. For example, you get tapered roller bearings at both ends of the crankshaft, eliminating all thrusts . . . foolproof air-cooling in all temperatures . . . an easily-serviced outside magneto with impulse coupling for easiest any-weather starts . . . heavy-duty construction, top to bottom.

Write today for the new 64-page application and specification booklet covering all 4-cycle single-cylinder, 2-cylinder and V-type 4-cylinder models, 3 to 36 hp.



**WISCONSIN MOTOR CORPORATION**  
World's Largest Builders of Heavy-Duty Air-Cooled Engines  
MILWAUKEE 46, WISCONSIN

A 7657-14



## LOW COST HEAT TREATMENT of small and medium size parts

• EF chain belt furnaces are the most satisfactory heat treating equipment yet devised for carbon restoration, scale free hardening and hardening without decarburization of small and medium size parts. Built in 11 standard sizes for capacities up to 2,000 lbs. per hour. Larger sizes to meet any requirement. Gas-fired, oil-fired or electrically heated, whichever best suits your particular requirement—and location. Estimates of equipment, installation and operating costs—and samples of treated parts—furnished promptly. Write for literature.

**THE ELECTRIC FURNACE CO.**  
GAS FIRED, OIL FIRED  
AND ELECTRIC FURNACES  
*Salem - Ohio*

Canadian Associates • CANEPCO LIMITED • Toronto 1, Canada

## EF GAS-FIRED OIL-FIRED and ELECTRIC FURNACES

for  
AGING  
ANNEALING  
BRAZING  
CARBON  
RESTORATION  
CARBURIZING  
CERAMIC  
DECORATING  
DRAWING  
HARDENING  
HOMOGENIZING  
MALLEABLING  
NORMALIZING  
NITRIDING  
SINTERING  
SOLUTION  
TREATING  
SPECIAL ATMOSPHERE TREATMENTS

A SIZE AND TYPE  
OF FURNACE  
FOR EVERY  
PROCESS  
PRODUCT OR  
PRODUCTION

## Defense Contract Awards

(Continued from page 142)

Crankcase—47 ea—\$27,457  
Spare parts—Various—\$37,037  
Bearing—1784 ea—\$146,395  
Crankcase—90 ea—\$52,578  
Spare parts—Various—\$842,082

### — V —

**Vickers, Inc., Detroit, Michigan**  
Hydraulic pumps—Various—\$246,564  
Valves—Various—\$37,970  
Hydraulic pump—Various—\$270,249  
Pump and motor assys.—Various—  
\$106,031  
Capital equipment—\$31,425

### — W —

**Westinghouse Electric Corp., Washington, D. C.**  
Jet engine test equipment at Lester,  
Pa.—\$514,500  
**Westinghouse Electric Corp., Aviation  
Gas Turbine Division, Philadelphia,  
Pa.**  
Maintenance parts—120 ea—\$33,031  
Maintenance parts—Various—\$148,620

### — Y —

**L. A. Young Spring & Wire Corp., Detroit, Mich.**  
Facilities—\$70,097

## BOOKS ...

**AUTOMOTIVE COLLISION WORK**, by Irving Fraze and Edward D. Spicer, published by American Technical Society, 848 E. 58th St., Chicago 37, Ill. Price, \$4.95. Automotive collision work in the past 15 years has grown more rapidly than any other branch of automobile maintenance and repair. Welding, cutting, bumping, shrinking, soldering, metal finishing, door aligning, and frame straightening are thoroughly explained in this book. The authors give detailed attention to both power tools and manual tools. The concluding section deals with the topic of estimating repair bills.

**AUTOMOTIVE FUEL AND IGNITION SYSTEMS**, by Irving Fraze, William Landau and Ernest Venk, published by American Technical Society, 848 E. 58th St., Chicago 37, Ill. Price, \$5.60. This handy book proposes to make the mechanic less a slave to the service manual and more an astute diagnostician and problem solver. The authors stress the basic operations which, when learned, make the mechanic an effective trouble-shooter whose deductive methods result in swift remedies. The authors explain the operation of the fuel system, the ignition, the battery coil, and the magneto. They then describe trouble-shooting procedures which quickly ferret out the cause of failure in these parts.

# TRANSUE FORGINGS



**USUALLY COST LESS AT  
THE POINT OF ASSEMBLY**

Aircraft motor mount forged from high grade alloy steel, is 5" long; weighs 3 lbs. net. Thin section of this part requires forging "know-how" to obtain maximum strength against shock and stress conditions.

Consult our engineers when you are contemplating conversion to forgings or when you are in need of reliable forging service.

**TRANSUE & WILLIAMS**

STEEL FORGING CORPORATION • ALLIANCE, OHIO

SALES OFFICES: NEW YORK • PHILADELPHIA • CHICAGO • INDIANAPOLIS • DETROIT • CLEVELAND

**OVER 50 YEARS OF FORGING PRODUCTION EXPERIENCE**

# Producers Pare Stamping Costs

## Modern Coil Handling Equipment Widens Use of Low Cost Coil Stock

The battle to keep down costs is going well for producers of stampings. Coil stock and modern coil handling equipment are the decisive factors. Coil stock, with only two scrap ends to its entire length is far more economical than strips of straight stock with two scrap ends to every ten feet. Moreover, the type of coil loading and handling equipment built by F. J. Littell Machine Co. makes coil stock easier to handle than straight stock. Stamping producers are taking full advantage of these developments. Coil stock and Littell Coil Hooks, Reels, Straightening Machines and Automatic Roll Feeds are in wider use today than ever before.

### Hooks Serve Two Ways

... Littell Hooks make it a simple matter to unload coils on delivery, and to load reels. The variety of sizes have lifting capacities from 1,000 to 40,000 pounds.

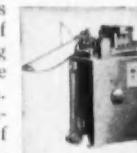


### Two Types of Reels . . .

Littell Coil Cradle Reels mount heavy coils, up to 30,000 pounds. Spindle Reels handle coils up to 40,000 pounds. Each type is available in plain or motor driven designs.



**Straighteners Flatten Stock . . .** Removing curvature from coil stock as it passes from reel to punch press die is the function of Littell Straightening Machines. All models are the same basic design. Variation is in the number and diameter of straightening rollers employed . . . from 1" to 90" in width, and from .010" to .125" thickness.



**Automatic Roll Feeds . . .** Press output in many shops has been multiplied five times by simply attaching Littell Roll Feeds to presses for blanking, drawing, piercing, or cut-off work. The Littell Roll Feed is used with compound dies, single station dies, and progressive dies. Standard models are easily attached, serve all types of presses, and handle all standard widths and thicknesses of stock.

Descriptive details and prices on Littell Hooks, Reels, Straighteners and Roll Feeds are available on request. Inquiries are given immediate attention when addressed to

### F. J. Littell Machine Co.

4107 N. RAVENSWOOD AVE.  
CHICAGO 13, ILL.

## News of the Industry

(Continued from page 98)

### Export of Cars to China Permitted in England

British manufacturers are now permitted to export automobiles to Communist China, according to a recent ruling by the Board of Trade. Shipments to China of vehicles of any type has hitherto been banned for strategic reasons.

The Government will now grant export licenses for automobiles regarded as having no military significance. Cars carrying up to six passengers are now approved, but station wagons are excluded.

Britain's post-war vehicle exports to China (other than via Hong Kong) reached their peak in 1946, when 422 automobiles and 39 trucks and buses valued at \$500,000 were shipped. Since then, sales have dropped off to practically nothing.

This relaxation of the embargo has been openly welcomed by the British industry and by the Society for Motor Manufacturers and Traders. Austin is seen as being the first to benefit, since it now hopes to fill a \$560,000 order for small cars placed by China when the Korean war ended.

### Wagner Electric Purchases Five-Acre Fulton Tract

Wagner Electric Corp. has purchased from the Fulton Iron Works Co. a five-acre improved tract adjacent to its present property in St. Louis, Mo. The tract contains five buildings, aggregating 125,000 sq ft of floor space. Terms of the transaction provide that Fulton may continue to occupy the premises for one year.

With this purchase, Wagner has acquired all the Fulton land and buildings. In 1952, Wagner bought 2.8 acres from Fulton in this same vicinity, and has remodeled buildings on this plot to accommodate expanded production.

### Plastic Roofing Material Deemed Fire-Resistant

Lexsuc, Inc., Cleveland, has reportedly developed a new fire-resistant roofing material that is said to be designed to cut such fire losses as that resulting from the GM Livonia fire. Focal point of the new roof is a vinyl plastic sheet that is alleged to stop dripping of inflammable as-

phalt or tar and which does away with combustible material between the roof deck and the insulation. Roof rigidity is likewise reported to be improved.

The plastic sheet which lies between the steel deck of the roof and the insulation is claimed to be fire-retardant and was developed for the purpose by B. F. Goodrich Co. Lexsuc, which is said to have a contract to roof over the Ford engine plant in Cleveland, also has announced a special clip for fastening the insulation to the steel deck.

### Canadian General Electric Abandons Jet Plant Job

The Canadian General Electric Co., Ltd., is resigning as operator-manager of the government's big jet engine repair and overhaul plant near Toronto. The government is negotiating with deHavilland Aircraft of Canada, Ltd., to take over the plant Jan. 1.

Canadian General Electric's decision to withdraw is said to have risen from the government policy to concentrate on production of the Orenda jet engine.

Canadian General Electric was principally interested in the J-47 jet power unit, produced by its parent General Electric Co. in the U. S.

### Ford Opens New Parts Depot

Ford Div. of Ford Motor Co. has opened its newest parts depot at West Mifflin, Pa., near Pittsburgh. It will carry more than 14,000 separate parts and accessories in stock to service dealers in Pennsylvania, West Virginia, Maryland, Ohio, and New York. It is the 28th depot established by Ford Div.

### New Aviation Trade Group Is Organized in Canada

A distinctly Canadian organization for aviation technical personnel is now in the advanced planning stage. To be formed early in 1954, the new group will be known as the Canadian Aeronautical Institute.

Ottawa has tentatively been named as the headquarters site of the new organization. Potential membership in Canada has been estimated at 800.

WHEN IT COMES TO PRODUCTION . . .

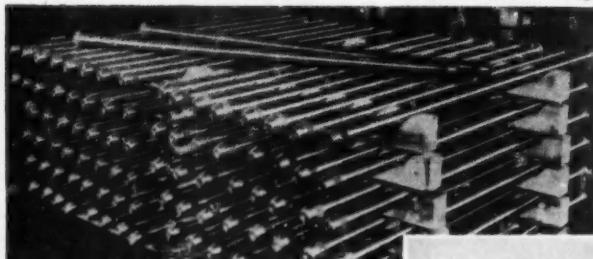
... come to

AUTOMATIC DRILLING & TAPPING MACHINES

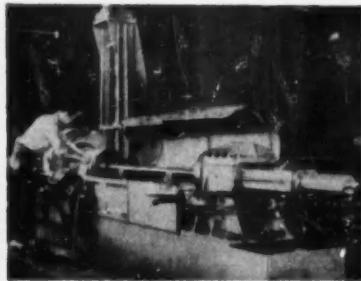
HARTFORD  
*Special*

THE HARTFORD SPECIAL MACHINERY CO. • HARTFORD 12, CONN.

# U-S-S Carilloy steel cushions bone-rattling jolts



Here are the Carilloy steel torsion bars ready for shipment. Torsion bars are used on the Patton 48, and others, so that the tanks can be built closer to the ground, giving a lower silhouette.



On this twister at the Cicero plant of Maremont Automotive Products, Inc., the finished Carilloy steel torsion bars are prestressed before shipment to the tank manufacturer.



THE army's amazing new Patton 48 not only moves faster, shoots straighter, and offers better protection to the tank crew than World War II models, but it has a vastly improved suspension system that features torsion bar springs made of U-S-S CARILLOY steel. As a result, it rides lower, more level, and with less jarring.

During rugged field tests, this 45-ton tank rolls along at more than 30 miles an hour, knocks down telephone poles and houses, rumbles over deep trenches and scales 3-foot walls. All the while, the CARILLOY steel torsion bars that support the driving wheels flex, twist,

and vibrate. They smoothly absorb most of the jolts.

Torsion bars withstand this heavy pounding . . . and do a better job of cushioning these shocks than previous spring systems. What's more they take less space, so the tank can be built closer to the ground and has a lower silhouette.

U-S-S CARILLOY 8660 is a Ni-Cr-Mo electric furnace steel which possesses the hardenability needed in these torsion bars. It will produce a minimum hardness of 55 Rockwell "C" at  $\frac{5}{16}$ " from the quenched end in the standard End Quench hardenability test. It has excep-

tionally good surface and sub-surface qualities.

Both the U.S. Army Ordnance Corps and the spring manufacturer, Maremont Automotive Products, Inc., are well satisfied with this excellent performance.

U-S-S CARILLOY steels are doing many tough jobs like this on both military and civilian products. No matter what steel problem you have, we have probably met and licked one like it before. We can help you solve yours. Just contact our nearest District Office, or write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO  
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS  
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

# Carilloy Steels

ELECTRIC FURNACE OR OPEN HEARTH



COMPLETE PRODUCTION FACILITIES IN CHICAGO OR PITTSBURGH

3-1814-A

UNITED STATES STEEL

# KELSEY-HAYES



A Kelsey-Hayes  
Wire Wheel

MAKERS OF QUALITY PARTS FOR  
THE AUTOMOTIVE INDUSTRY FOR FORTY-FIVE YEARS



Wheels, Brakes, Hubs and Drums . . . also Parts for Farm Implements and Aircraft

**KELSEY-HAYES WHEEL COMPANY**  
DETROIT 32, MICHIGAN

PLANTS IN DETROIT AND JACKSON, MICHIGAN; MCKEESPORT, PA.;  
LOS ANGELES, CALIF.; DAVENPORT, IOWA; WINDSOR, ONTARIO, CANADA





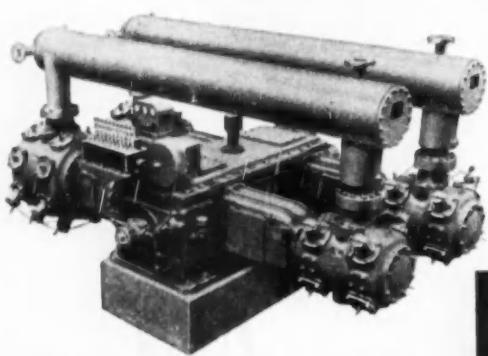
*Install it anywhere*

## Space and location are rarely a problem

One of the biggest factors in determining the location of an air compressor is its foundation requirements. Obviously, the more a compressor vibrates, the heavier the foundation must be.

You won't face such problems with a Clark Balanced/Opposed, Motor Driven Compressor. There are no vibrations . . .

*They're all cancelled out!*



© 1953, Clark Bros. Co., Division of Dresser Operations, Inc.

If you'd like to install a Clark unit on an upper floor that's structurally strong enough to support its weight, do it . . . and you won't need much space, either. Its compact design permits installing a large amount of horsepower in a limited floor area . . . and its precision construction means you can practically forget about it once it's in operation.

For complete details on this truly modern air compressor in the 150 to 4500 hp range, write for Bulletin 118 or get the facts first hand from your nearest Clark representative.

CLARK BROS. CO.

• OLEAN, N. Y.

Division of Dresser Operations, Inc.

Sales Offices in Principal Cities Throughout the World

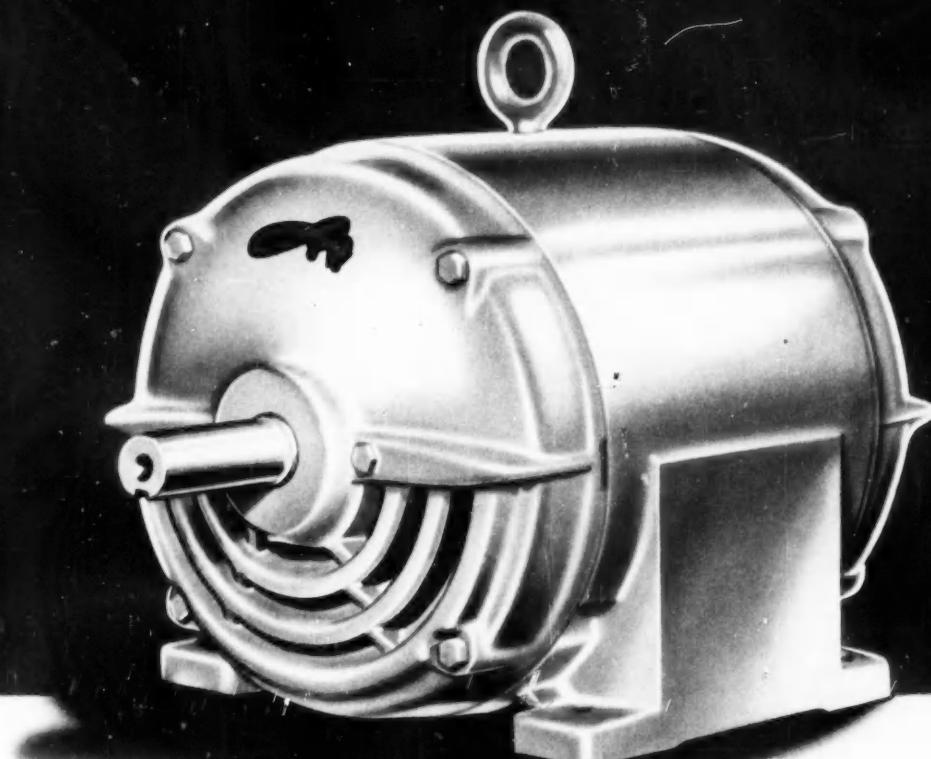
PRECISION BY THE TON

**CLARK**

**balanced/opposed  
compressors**

Not just a "face-lifting" to meet the new NEMA standards,  
but a completely redesigned motor line

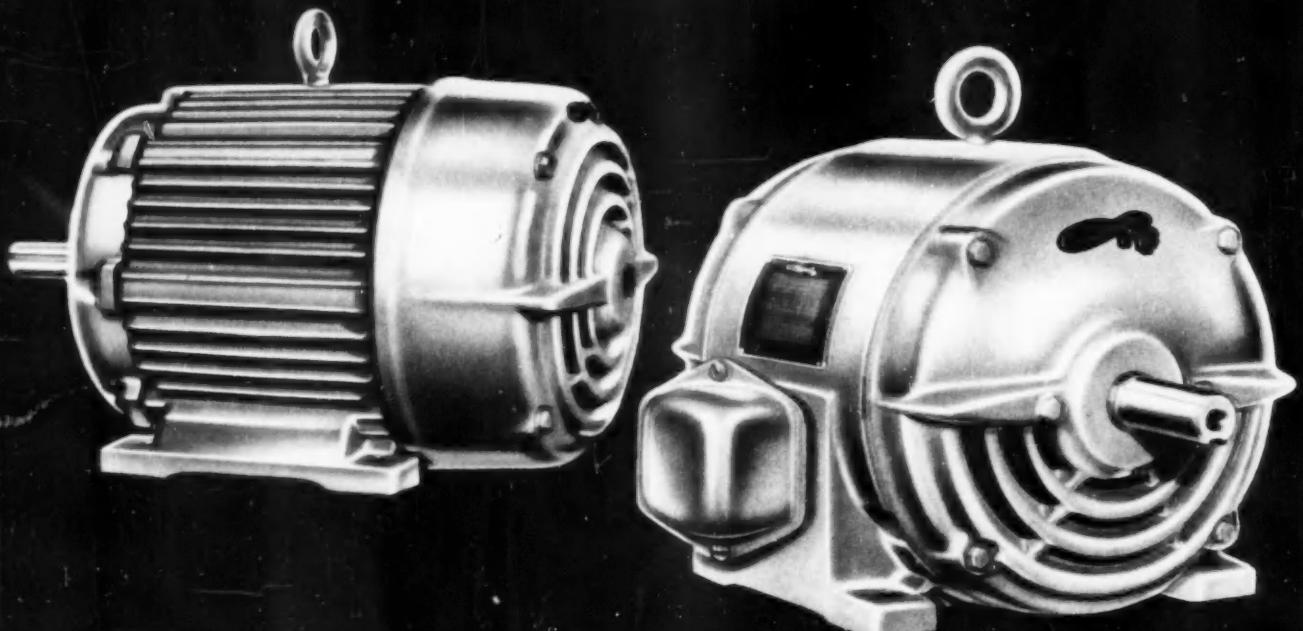
*The Louis Allis Co.  
proudly presents  
the NEW L.A. Line  
of electric motors*



... the concentrated utilization of over 50 years of engineering and development  
brings you this new concept in motors.

*Please turn the page . . .*

Here's new power for all  
standard and special motor applications



▲ New L. A. Fan-cooled and Explosion-proof Motor

▲ New L. A. Open Drip-proof Motor

*From over 50 years of motor building experience and  
many famous firsts including*

the first fan-cooled, explosion-proof motor  
the first rapid-reversing motor  
the first really splash-proof motor  
the first screenless textile motor

comes the NEW  Line

Here's the motor that's entirely new through and through, with such features as new modern styling...improved ventilation...greater protection...new conduit box arrangement...new bearing construction...and more versatile mounting. Get the facts on the most up-to-date motors available—

the new L.A. line. See how these new motors can provide more power in a smaller package for your product or plant...with the same high standards of Louis Allis performance, temperature ratings, service factors and torques. Call your Louis Allis Sales Engineer for the complete story.

*Special Note* Louis Allis motors, built to the same high standards of quality and performance in the old NEMA standard frame sizes, will still be available if you require them for interchangeability or replacement.

THE LOUIS ALLIS CO. • MILWAUKEE 7, WISCONSIN

# WHY IT PAYS TO BUY STEEL FROM WAREHOUSE



## You don't need to freeze money in inventory!

### WHEN YOU BUY STEEL FROM WAREHOUSE, YOU GET:

- LOWER INVENTORY COSTS
- LOWER SPACE COSTS
- LOWER TIME COSTS
- LOWER CAPITAL INVESTMENT
- FASTER PRODUCTION
- FEWER INVENTORY LOSSES

LET your U. S. Steel Supply warehouse serve as your inventory stock. Then you eliminate from your overhead the cost of carrying your own inventory, and free a substantial portion of your capital for other purposes. U. S. Steel Supply can always deliver the steel you want to your plant or job site at the time you specify. Just tell your U. S. Steel Supply salesman what you want . . . when . . . and where.

# U. S. STEEL SUPPLY DIVISION

General Office  
208 So. La Salle St., Chicago 4, Ill.

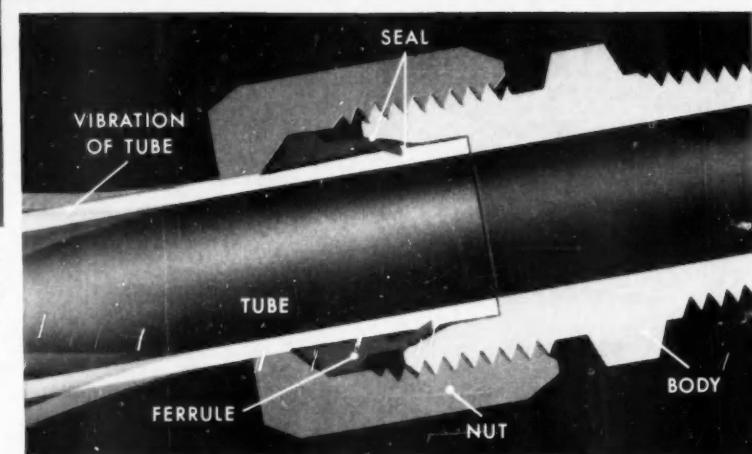


Warehouses and Sales Offices Coast to Coast

UNITED STATES STEEL



**Shaking furiously**, this machine, built by Columbia Machine Works of Vancouver, Washington, molds 8 building blocks per minute. It compresses concrete, vibrates it under 350 psi, and ejects finished blocks.



**Cutaway shows how vibration** is damped by the rear bevel of the ferrule. Note how it grips the tube. This prevents stresses at the double seal and assures a leakproof connection. The nut also helps support the tube.

## GOT THE SHAKES?

# Solve your tube vibration problems with leakproof Parker Ferulok flareless fittings

This machine shakes from stem to stern. Because of the extreme vibration, maintenance of hydraulic lines was a big problem until the design was changed to specify Parker Ferulok flareless fittings. Since then the manufacturer has not had a single call for hydraulic line maintenance nor received any customer complaints.

Here's what makes Ferulok flareless fittings leakproof on such critical applications:

These flareless steel fittings have a double seal. Wedging action of the ferrule, when drawn down by the nut, forms a seal between body and ferrule. The cutting edge of the ferrule "bites" into the outer surface of the tube, forming a second positive seal. Self-centering action assures an even "bite" around the circumference of the tube. The extent of the bite at the cutting edge of the ferrule is completely visible when the fitting is taken apart.

Vibration won't break these seals. The rear

bevel of the ferrule grips the tube. This damps vibration and prevents stresses from concentrating at the line of "bite".

Parker Ferulok flareless fittings are designed especially for high-pressure, heavy-wall tubing. *Ferulok are the fittings that conform with the new S.A.E. Hydraulic Flareless Tube Fittings Standard.* Of course, they also meet J.I.C. Hydraulic Standards for flareless fittings.

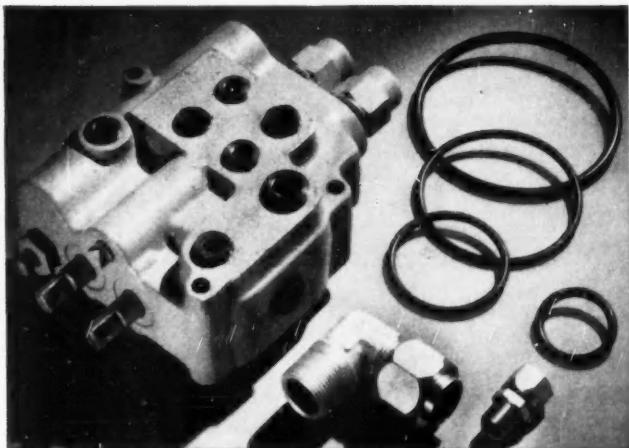
You have no assembly problems when you specify Parker Ferulok. Simply use a wrench; no special tools are needed.

Why not specify Parker Ferulok flareless fittings for your heavy-wall tubing applications? We now offer a greatly expanded Ferulok line with a complete range of body shapes and sizes for tubing through 2 inches, outside diameter.

TUBE AND HOSE FITTINGS DIVISION  
The Parker Appliance Company  
17325 Euclid Avenue, Cleveland 12, Ohio

# Parker

Hydraulic and fluid  
system components



What other Parker products for hydraulic and fluid systems interest you? Triple-lok flare fittings? Hydraulic control valves? Synthetic rubber O-rings? Any other Parker products?

THE PARKER APPLIANCE COMPANY

Section 401-G  
17325 Euclid Avenue  
Cleveland 12, Ohio



Please rush Parker fittings catalog No. 4300

Information about the following products: \_\_\_\_\_

NAME \_\_\_\_\_

TITLE \_\_\_\_\_

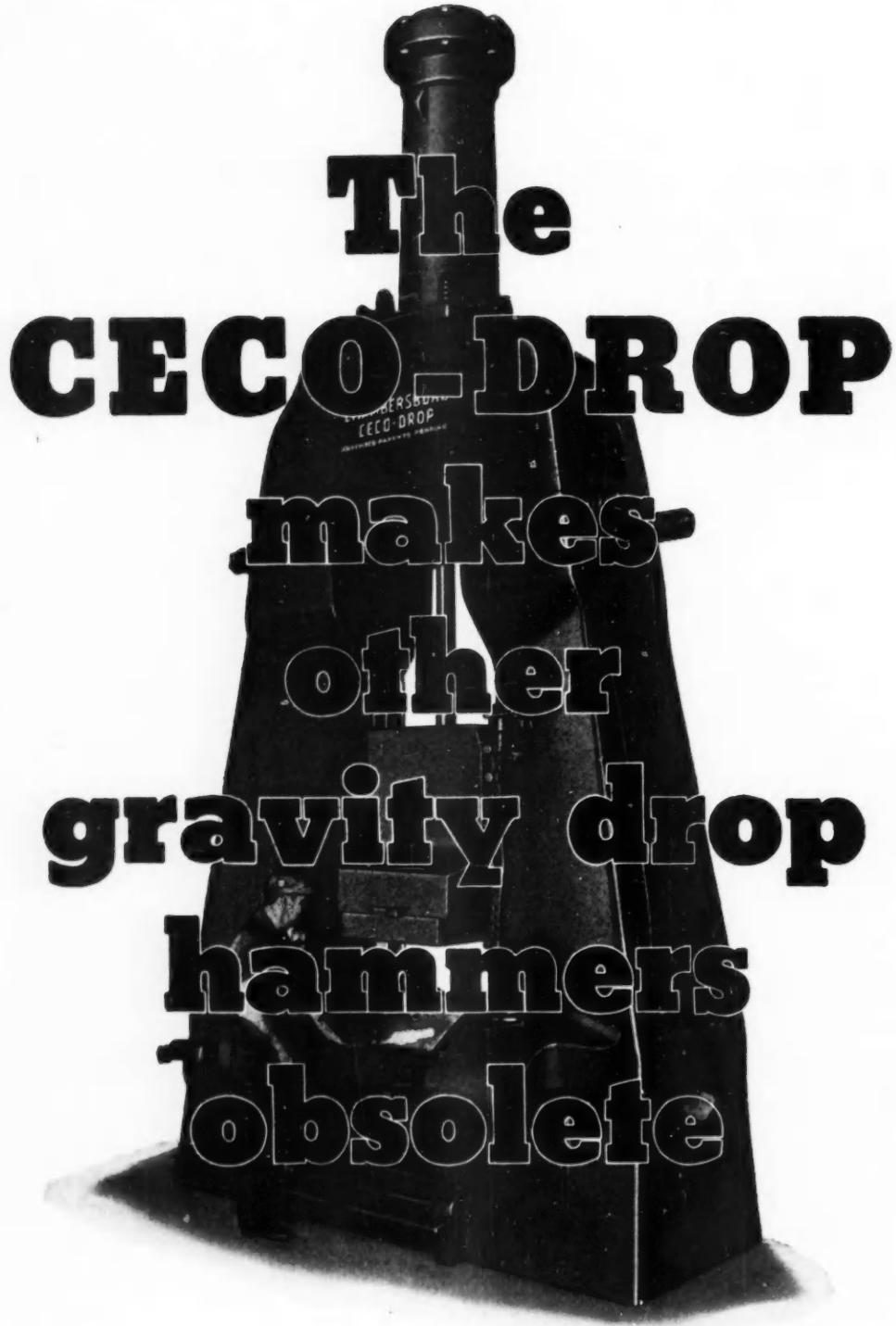
COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

STATE \_\_\_\_\_

Send for catalog of complete information about Parker tube fittings. If you'd like to know about Parker products, please list them on the coupon or write to the above address.



**CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.**

# Salvage of rejects speeded by new metallizing alloy

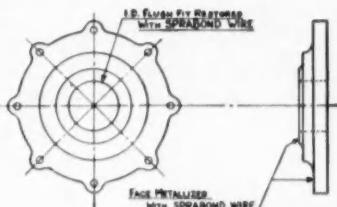
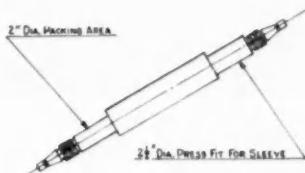
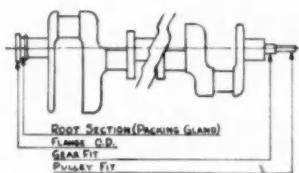
## outwears old bearing material 25 times

**Automotive manufacturers replace chrome plating installation with metallizing for salvage of mis-machined crankshafts; step up output to 10 per hour**

Sprabond Wire, the new self-bonding metallizing alloy, is speeding reject salvage in a wide range of production applications. It has been found particularly valuable in building up parts which have been machined undersize, or damaged by tool marks. Resulting surfaces are extremely hard and, due to their microscopic pore structure, tend to hold considerable amounts of oil. These factors produce excellent wear characteristics, some users reporting increases in service

life as much as 25 times that obtained in any other way.

Application is simple and fast; only 3 operations: (1) the part is cleaned or undercut; (2) Sprabond Wire applied; (3) the surface finish-ground. Dovetailing and undercutting often not required and build-up can be carried to a feather edge. No danger of warpage because negligible heat is generated in the part during spraying.



### Better and faster than plating

Sketch shows automotive crankshaft of the type being reclaimed in quantity by large manufacturer. These parts were formerly reclaimed by plating, which was slow and expensive. With metallizing, however, production rate is 10 shafts per hour.

### Where welding is impractical

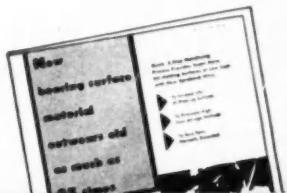
Heat warping and consequent straightening costs made welding impractical for salvage of blower shaft such as shown above. Shafts formerly scrapped and replaced are now rebuilt. With Sprabond Wire metallizing, saving is \$45.00 each.

### Fits restored—no re-machining

Press fit in electric motor end bell is frequently lost through wear. Welding is impractical here, too, because of warpage. But a few thousandths of Sprabond Wire on the I.D. builds a press fit so that even minimum grinding is often unnecessary. Savings per end bell—about \$30.00.

### Some other money-saving applications for the Sprabond Wire process

Cracked blocks and castings — flat surfaces — molds, patterns, match plates — sand holes — thin sections — lathe ways — inside diameters — gas holes.



FREE Metco Bulletin 57B describes the advantages of the Sprabond Wire metallizing process in detail. Micro-photograph of Sprabond Wire coating on steel shows how it works. Use the coupon to send for your free copy today. No obligation, of course.

The following trade names are the property of Metallizing Engineering Co., Inc.: METCO®, SPRABOND WIRE. • Reg. U. S. Pat. Off.

Don I. Watson  
Metallizing Engineering Co., Inc.  
38-14 30th St., Long Island City 1, New York

Please send me Bulletin 57B.

NAME \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

**METALLIZING ENGINEERING CO., INC.**

38-14 30th STREET



LONG ISLAND CITY 1, N. Y.

In Great Britain: METALLIZING EQUIPMENT COMPANY, LTD., Chobham near Woking, England



**OSBORN**

## This brush cleans up when the chips are down

**Deep down** in the threads of these stainless steel coupling nuts are tiny abrasive chips and burrs which can ruin a good fit and costly thread gages.

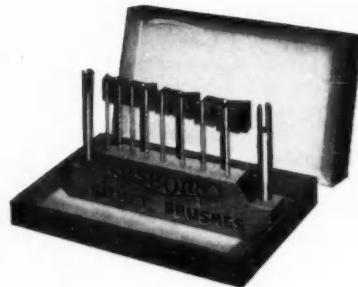
The problem here was to clean out those chips and burrs *completely*. Hand methods were slow and far from thorough. The inspection bench kept sending too many back for re-working... time-consuming, costly.

Then Osborn Situft Brushes were tried and the threads were deburred and "de-chipped" quickly and cleanly every time. Mounted in its holder, the Situft Brush is chucked in the tapping head. Then the brush

threads its way in at 100 fpm, reverses and threads its way out at 200 fpm... the bristles getting down to the roots of the threads and removing all abrasive chips and burrs without a miss.

If you have any kind of a deburring, cleaning or finishing problem, a special Osborn-equipped machine or Osborn brushing machine may be the answer you're looking for. We'd be glad to send you the new free Bulletins on Situft Brushes and Automatic Deburring. Or, if you prefer, why not take advantage of the wide experience of your **Osborn Brushing Analyst** to help on your problem. Call him today, or write *The Osborn Manufacturing Company*,

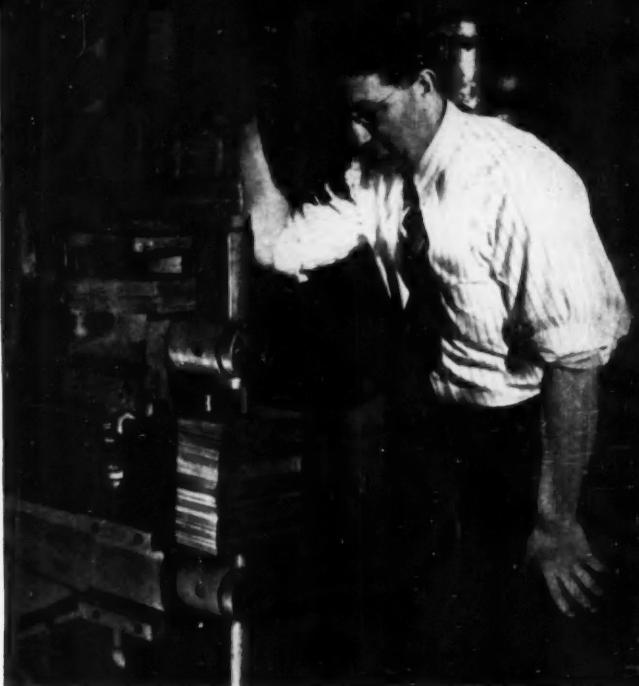
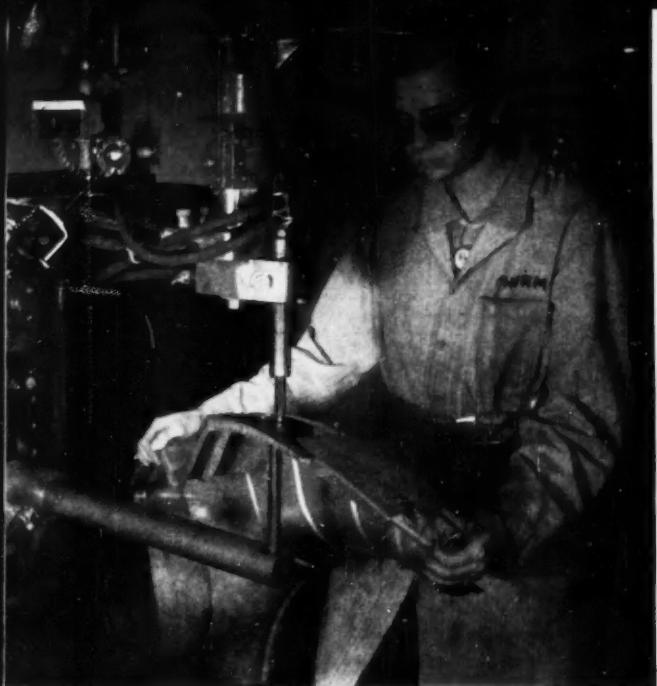
Dept. E-12, 5401 Hamilton Avenue,  
Cleveland 14, Ohio.



*Kit of Situft Brushes and bolders is available. Variety of brush sizes to suit various applications. Write for bulletin on Osborn Situft Brushes.*

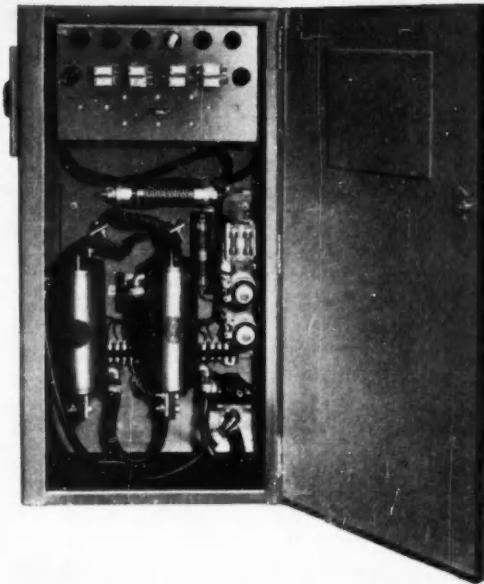
# Osborn Brushes

OSBORN BRUSHING METHODS • POWER, MAINTENANCE AND PAINT BRUSHES • BRUSHING MACHINES • FOUNDRY MOLDING MACHINES



WHETHER YOU'RE WELDING 2 PIECES OR 199...

# G-E Resistance Welding Controls Make Faster, More Accurate Welds



**TYPICAL PANEL** is neat, compact. Advanced circuit design is result of long experience in control design and manufacture. Spot-welding panel above is non-synchronous NEMA Type N2.

The occasion probably will never arise when you'll have to weld 199 pieces of metal together, but you could—with G-E controls.

**SINCE 1888**, when Elihu Thomson developed the first resistance welding transformer, G-E engineers have been designing welding controls for all production requirements. Whether your operation demands speed or accuracy or both, specify G-E control. G.E.'s complete line includes synchronous-precision, nonsynchronous, three-phase, and all special-purpose accessories for all welders.

**FOR MORE INFORMATION**, contact your nearby G-E Apparatus Sales Office or welding machine manufacturer or his agent, or write:

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General Electric Company  
Schenectady 5, New York

Please send the following bulletins:

GEA-5816, "The Story of Resistance Welding"; theory behind the process and complete description of all G.E.'s controls.  
 GEA-5945, "Synchronous-Precision Control."

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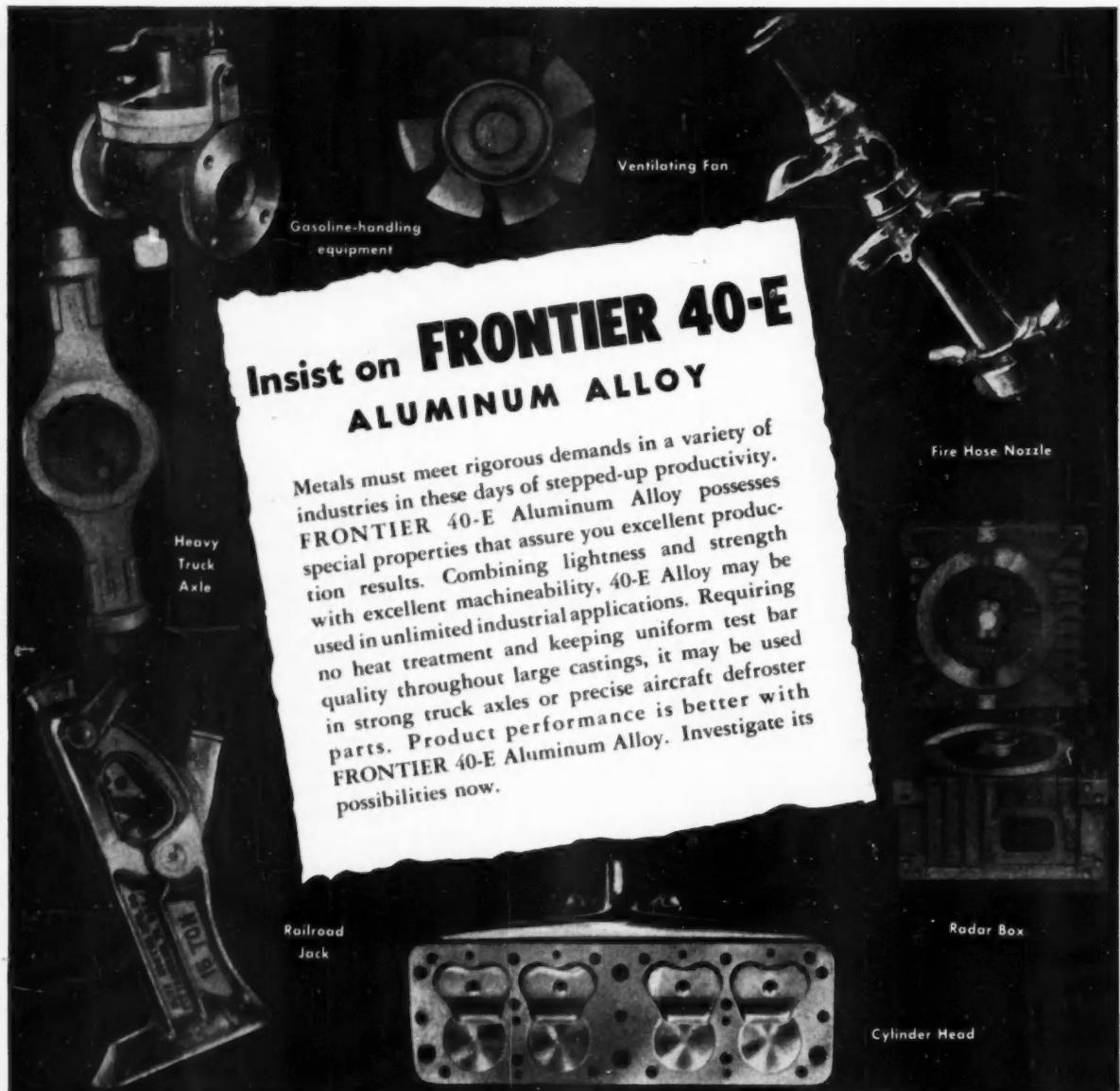
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## how SURFACE DEFECTS impair bearing operation

No matter how smooth a ground surface may appear, examination will reveal imperfections in the form of grinder scratches and ridges, feed spirals, chatter marks and partially loosened metal splinters. Upon contact, these minute peaks and ripples interlock with the mating surface of the bearing, tending to rupture the protective oil film. Fragmented metal is torn from surfaces to mix with lubricant and cause abrasive wear,

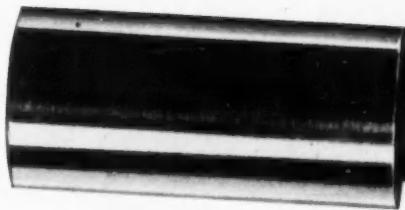


increasing clearance dimensions and shortening life. Photo at right shows an example of a scratched and galled surface which stopped rotation by "plowing" metal.



## how SUPERFINISH insures bearing life

Superfinish removes all surface defects such as grit scratches, feed spirals and the soft "smear metal" caused by grinding heat, and having removed the faulty layer—gets down to metal of the desired structure and hardness. At the same time, it produces a more nearly perfect geometrical form which supports a more efficient oil film for lubrication. There are no projecting defects to churn the oil film or cause metallic contact.



Load carrying capacity is substantially increased by Superfinishing. And bearing life is greatly prolonged.

## you should know the facts about **SUPERFINISHING!**

It may surprise you to know what a quick and inexpensive process Superfinishing really is. It can greatly reduce the cost of grinding and, in many cases, eliminate such expensive operations as hand lapping and polishing.

If you have not yet read the booklet "Wear and Surface Finish," we will be glad to send you a copy of this authoritative text book with our compliments. Please request it on your company letterhead.



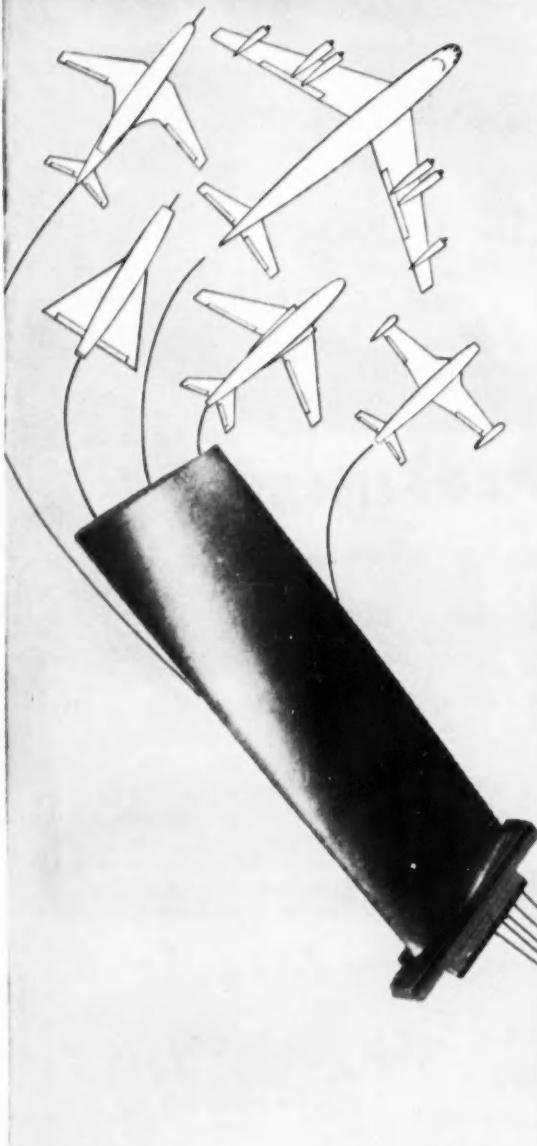
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For this reason MAXIPRESSES are being chosen for the vast portion of the American, Canadian and British jet forging installations.

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## NATIONAL OIL SEAL LOGBOOK

Write our Redwood City office for reprints of this Logbook page

## Sealing News & Tips

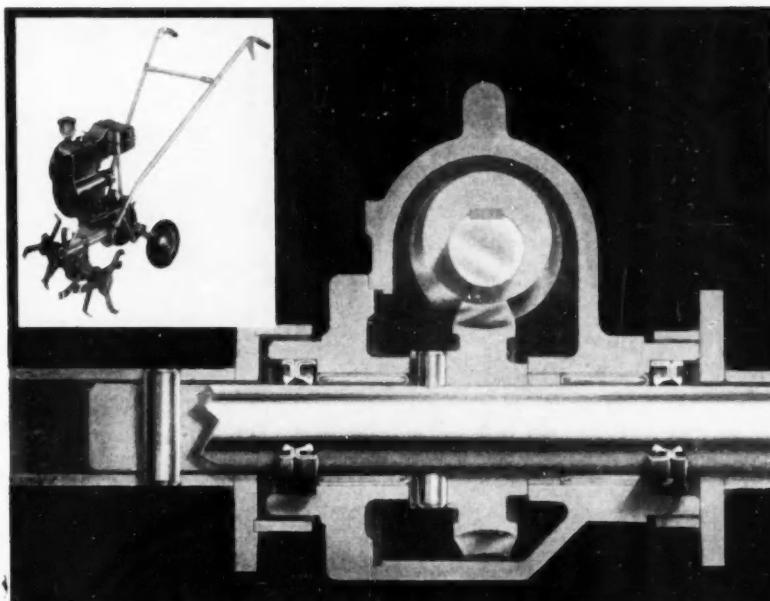


Figure 1. Gear housing assembly, Choremaster Garden Tiller

## How National Syntech<sup>\*</sup> Oil Seals halt leakage, exclude dirt from Choremaster Garden Tiller

In the Choremaster Garden Tiller, tines are driven and the machine propelled through a worm gear assembly at the front of the unit. Dirt, dust and mud pack heavily around this forward gear box (Figure 1), making it difficult to achieve 100% exclusion of foreign matter and zero leakage of lubricant without unacceptable loss of power.

After other sealing methods failed, two National Syntech (synthetic rubber) Oil Seals were installed back to back at either side of the gear box. A National 340,000 springless seal was faced outward to exclude dirt and a spring-tensioned National 350,000 seal was faced inward to retain gear oil. Immediately, the small investment in precision National seals paid off. Positive dirt exclusion and zero leakage were achieved. And, thanks to the knife-edge,

\*T. M. Reg.

low-friction Syntech sealing lip, there was almost no loss in power.

National Syntech Seals are used in a wide variety of applications, including those with speeds to 3,600 F.P.M., temperatures to 300°F and runout to .030 indicator reading. National Oil Seals have helped many manufacturers increase performance, lengthen life, or make products easier to assemble or service. Next time you need oil seal information or engineering help, why not call the National Applications Engineer nearest you?



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In the Choremaster Tiller, National Applications Engineers helped solve a problem by utilizing two of 2,500 standard-design National Oil Seals.

Catalog 102-A (available on request giving name and title) lists most National seals—springless and spring-tensioned, single and dual lip, shaft and external, leather or synthetic rubber. In most cases one or more of these standard designs will give efficient, low-cost sealing. If special operating conditions, space limitations or other features rule out use of these standard-design seals, modified or special seals can be engineered. Your nearest National Applications Engineer has full information; or, write direct.



National, a leader in oil seals, also offers a complete quality line of commercial grade O-Rings in all standard sizes. Write for new National O-Ring catalog which lists all O-Rings, includes information on design, applications, performance, back-up rings, etc.

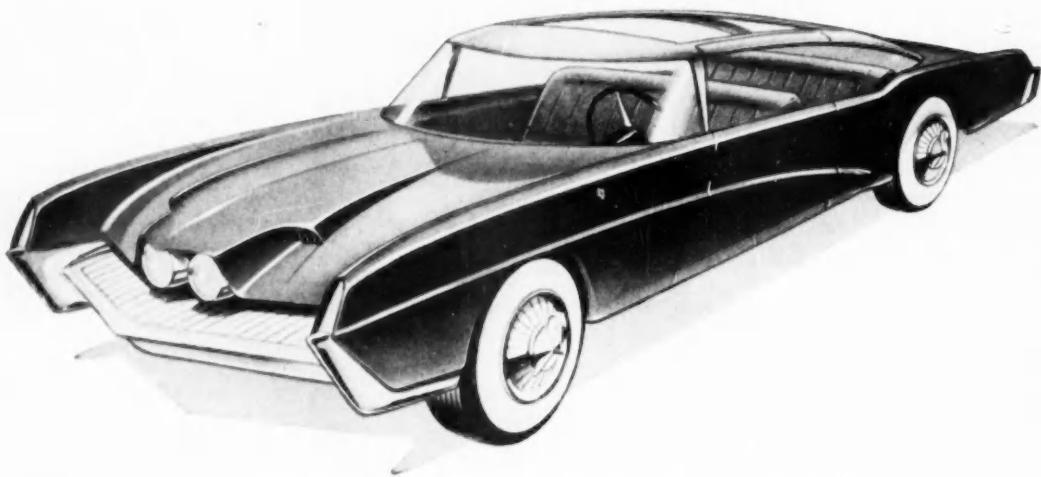
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2822

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*Reynolds looks forward  
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F. Eugene Smith      Samuel Scherr



Smith and Scherr are independent industrial designers with offices in Akron, Ohio. Prior to their partnership, they were both actively engaged in design work in Detroit for General Motors and Ford.

The "car of tomorrow" pictured above is from the drawing boards of Smith and Scherr. This modern design calls for an aluminum telescoping top, aluminum in inside door panels, instrument area, grille and bumper areas, body panels and trim as well as in hundreds of hidden mechanical parts. Air intake areas and front end height have been reduced and a flat wrap around radiator similar to the types used in blimps is suggested.

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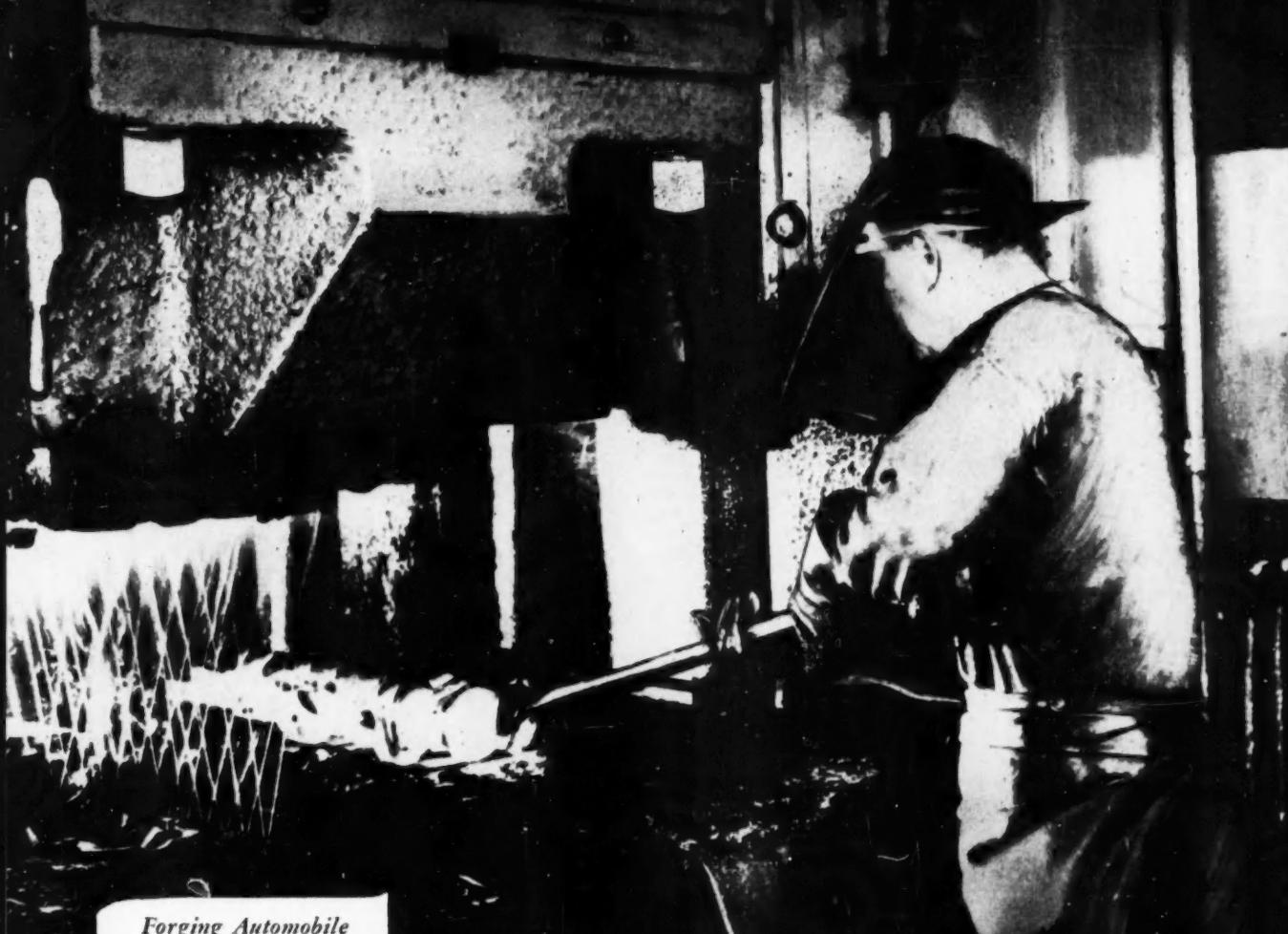
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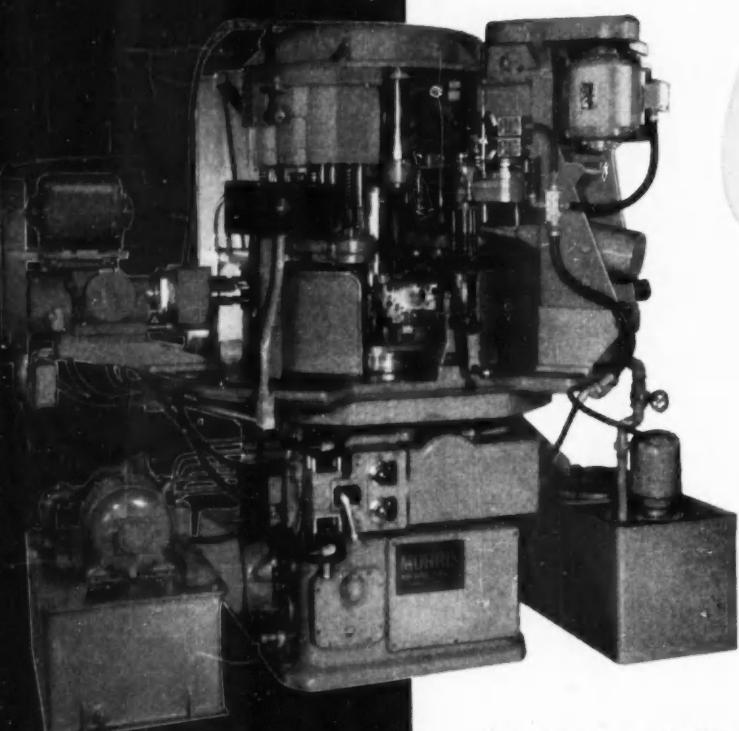
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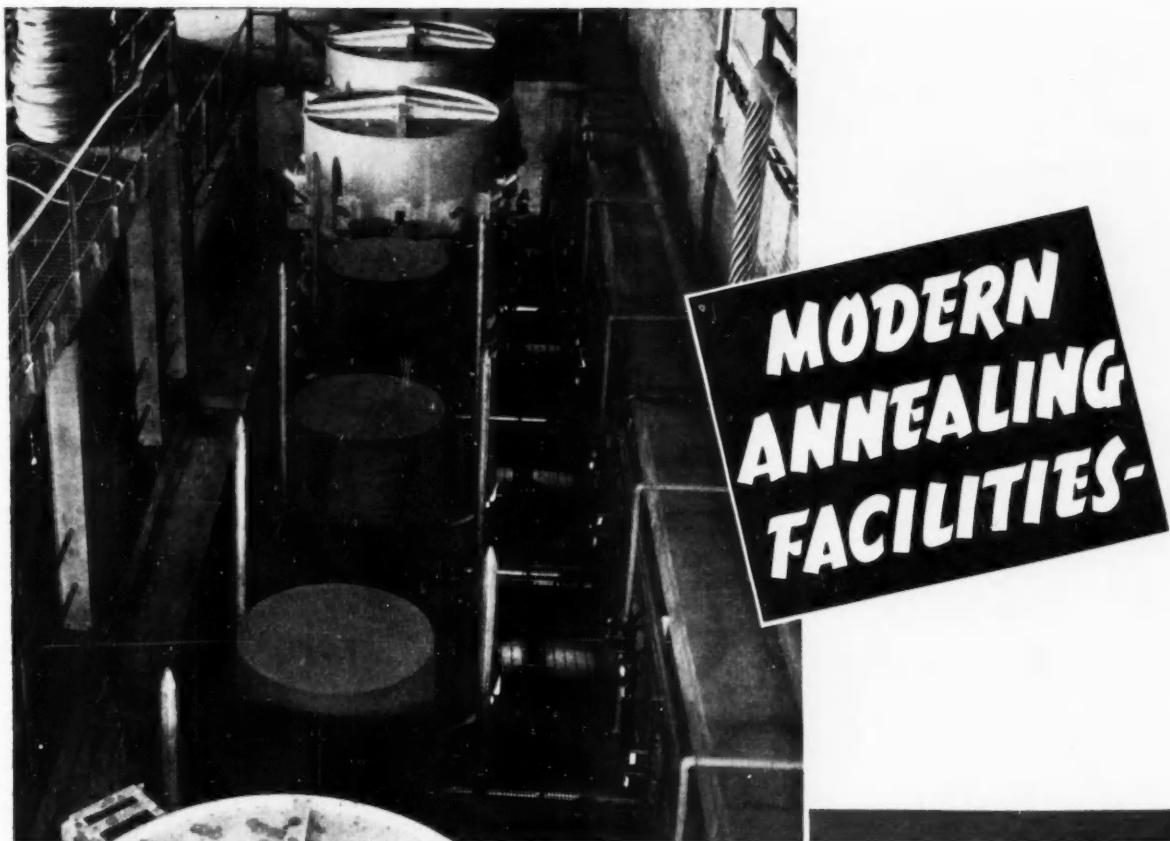
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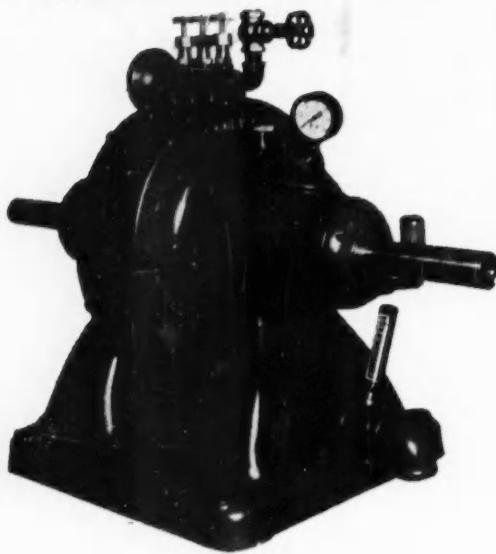
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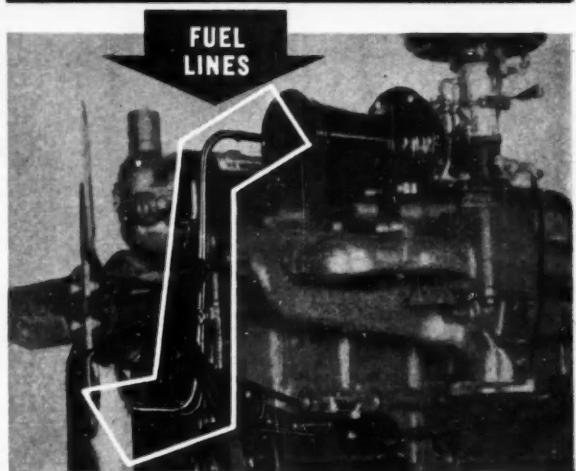
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ALCOA Utilitube\* is corrosion-resistant aluminum coiled tube made of a special alloy (50S). It is ideal for carrying air for instrument lines—gasoline and fuel for internal combustion engines—lubricating oil for engines and machines—fluids for hydraulic systems. It actually offers you initial savings up to 40 per cent over copper.

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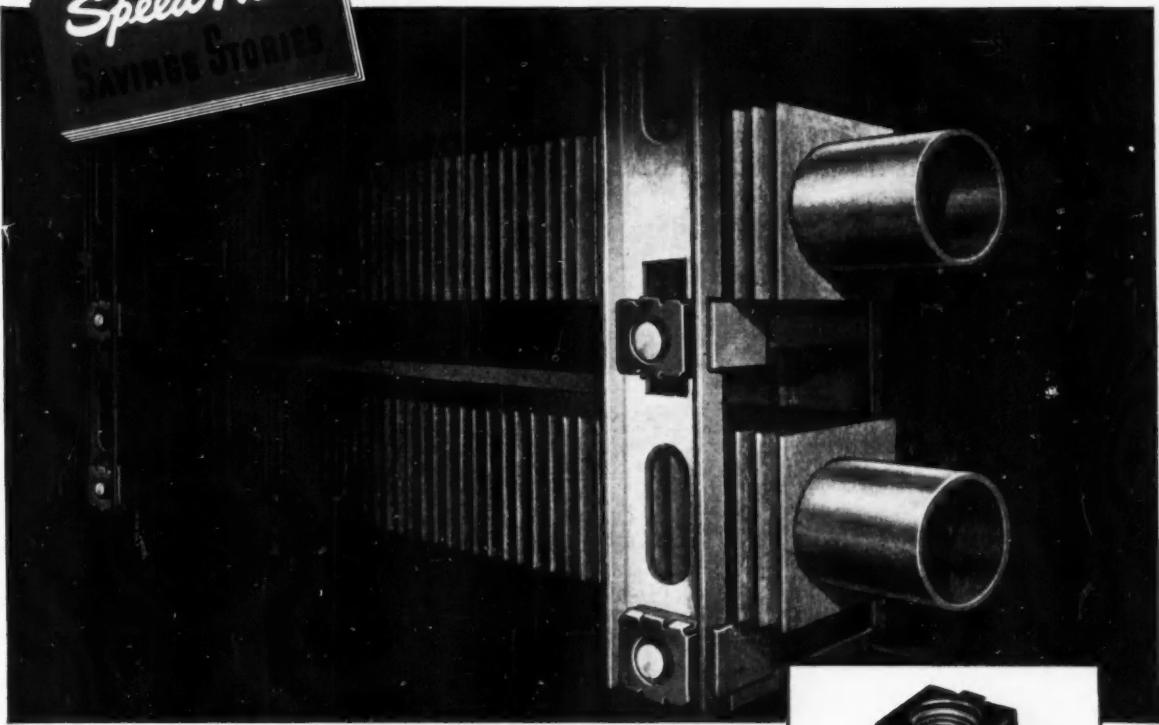
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AUTOMOTIVE INDUSTRIES, December 15, 1953

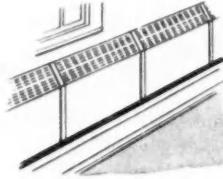
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*In Canada: Dominion Fasteners, Ltd., Hamilton, Ont. In Great Britain: Simmonds Aerocessories, Ltd., Treforest, Wales. In France: Aerocessaires Simmonds, S.A., 7 rue Henri Barbusse, Levallois (Seine).*



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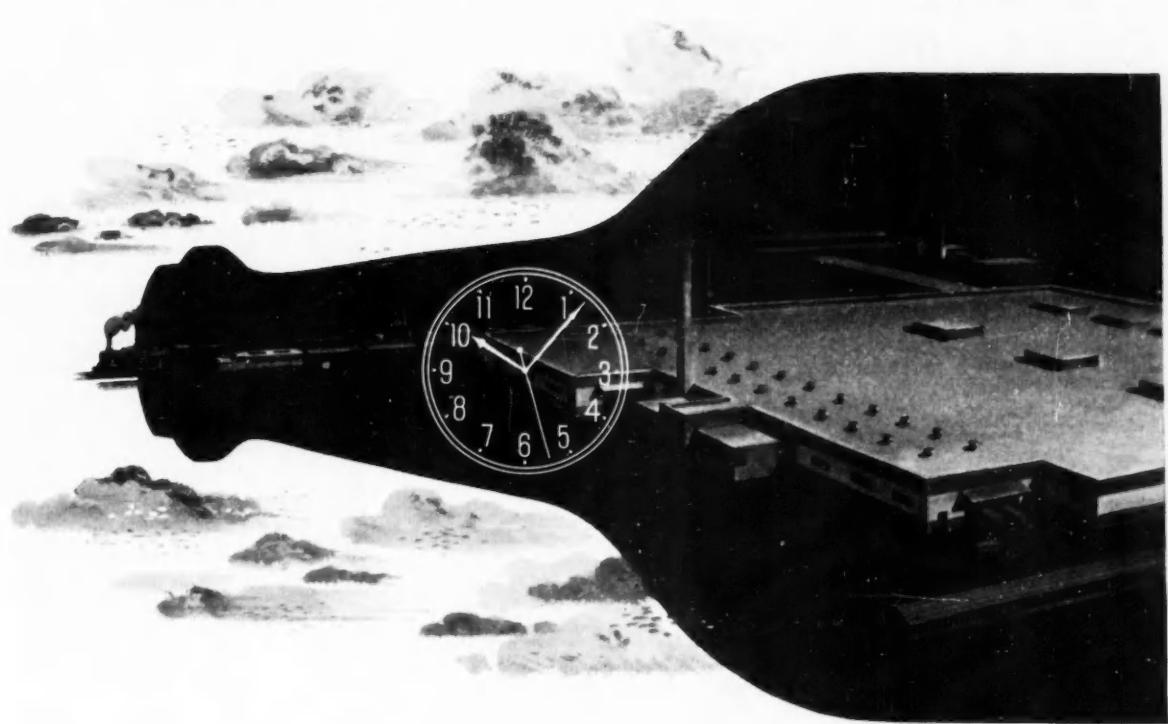
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You built the finest plant engineering brains could conceive. You provided up-to-the-minute tooling—polished up distribution and sales. But all that was only a good start.

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And there's your built-in bottleneck at work with a vengeance. You've got to do one of two things. You can figure

that what with taxes, and your machine tool inventory, only partially depreciated, you'll wait.

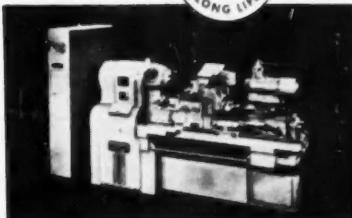
Or, instead of fighting a losing battle, you can size up your earnings and reserves—face the fact that it is machines, not dollars, that keep a plant competitively productive—burst your bottleneck wide open—and build for the greatest years your company can hope to have.

If you figure that way, you can count on Monarch lathes and Monarch engineering to back you all the way. . . . *The Monarch Machine Tool Company, Sidney, Ohio.*

**FOR A GOOD TURN FASTER . . . TURN TO MONARCH**

# Monarch

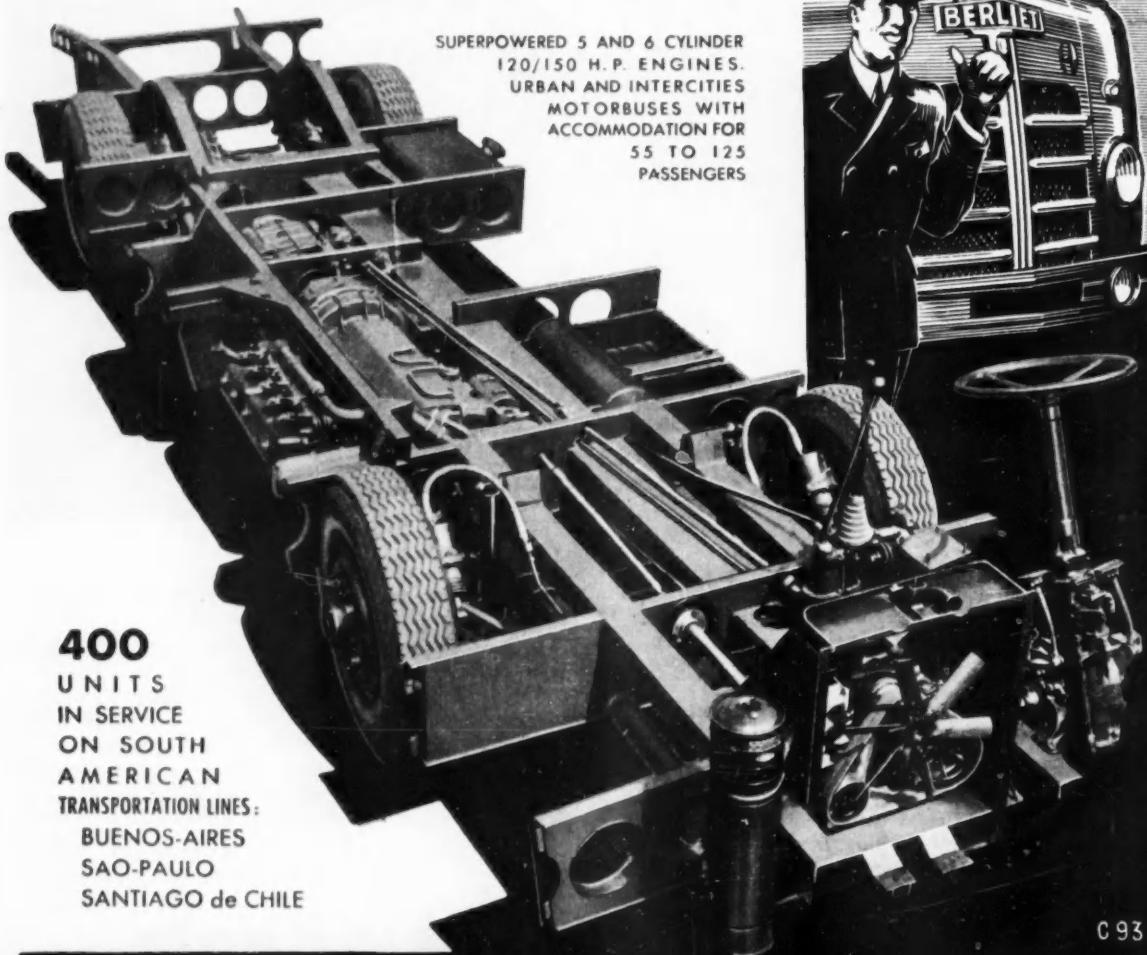
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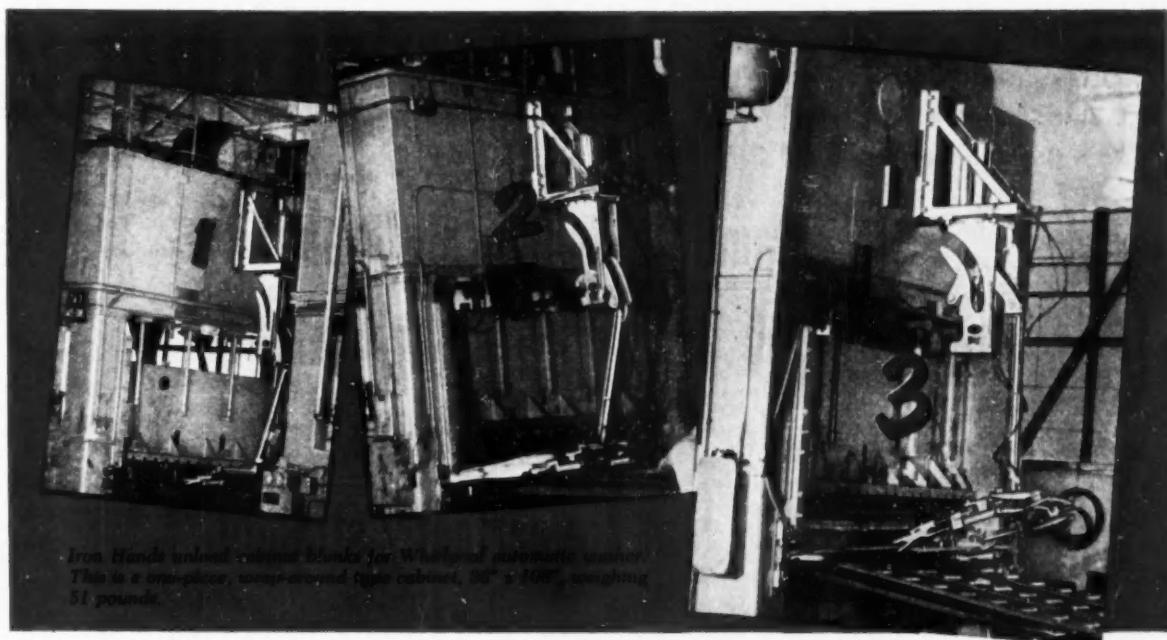
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**Saves \$20,000 annually...reduces accident hazard**

### **Dependable operation of Iron Hands boosts production of automatic washers**

Whirlpool Corporation recently installed Sahlin Iron Hands on three presses to automatically unload 51-lb. cabinet blanks for their automatic washers. By using the maximum press capacity for the first time, they obtained immediate increase in production—an increase, which according to Whirlpool officials, results in savings "in excess of \$20,000 annually".

In addition to dollar savings, manpower requirements were reduced 40%. And the accident hazard was cut proportionately. Moreover, the three Iron Hands have given dependable service since their installation.

But Whirlpool's experience is no different from that of hundreds of others. Now, virtually every

large stamping plant in the world uses these swinging arms to unload all types of press stampings—large and small. And they can be applied with equal efficiency to brakes, shears and forging machinery. The Iron Hand principle has also been adapted to floor-type extractors and to special feeding and unloading machines.

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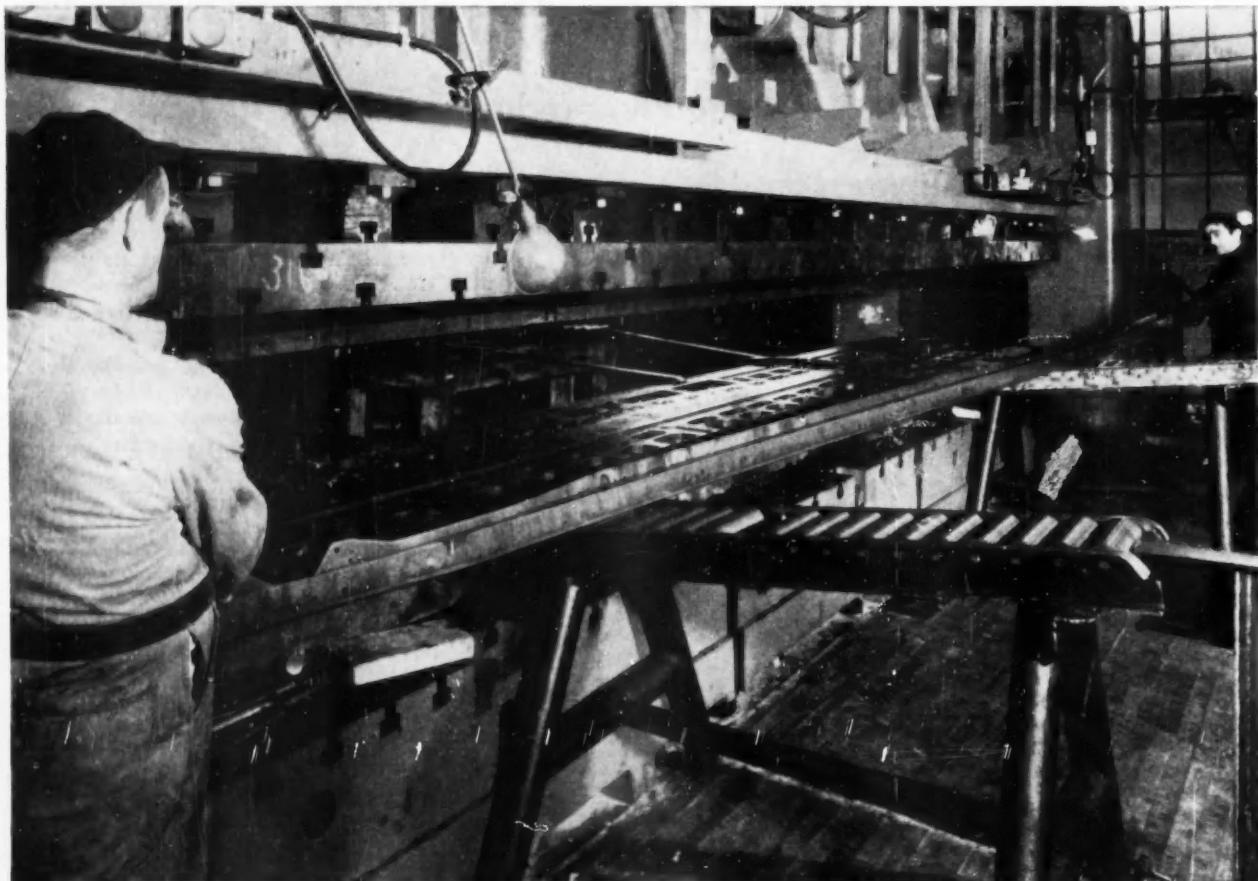
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# SAHLIN

# THE LARGEST MECHANICAL PRESS

New Hamilton 4000 tons capacity press, in which there is no relative deflection in bed and slide, forms side rails that are perfectly straight.



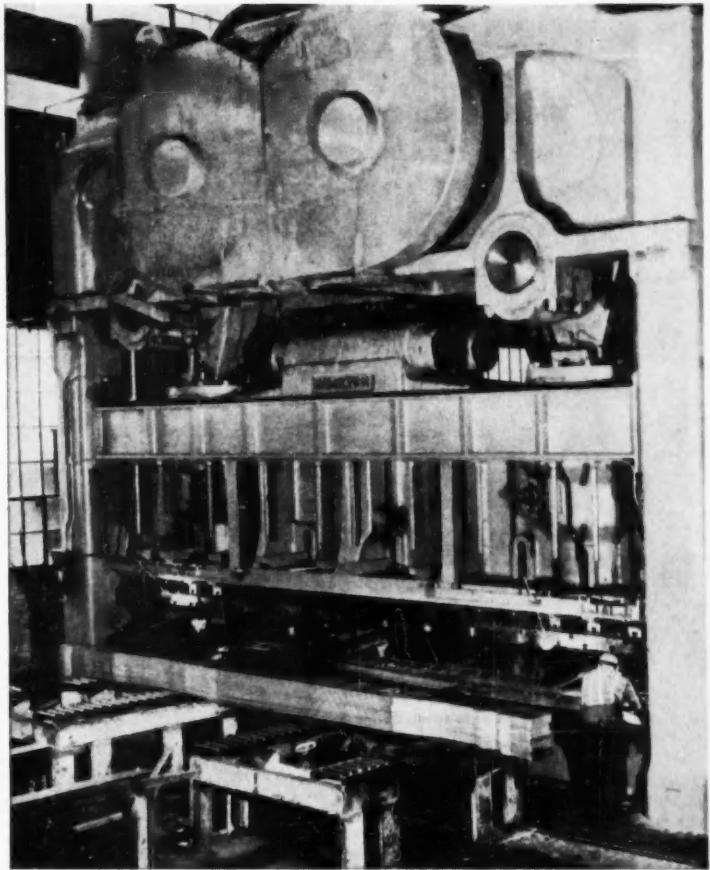
**22-FT. SIDE RAIL** is shown above being removed from the press. Perfectly straight 26½-ft. side rails of  $\frac{3}{8}$ -in. steel can be formed without camber or "bow." The pressure pad is supported on six air cushions which function as a unit to prevent distortion when the side rail is ejected from the die.

# EVER BUILT

This Hamilton Side Rail Press was placed in production last winter in the Cleveland Plant of Midland Steel Products Company. It is an enormous machine, weighing 900 tons, which in itself is newsworthy. However, the outstanding feature is its ability, when loaded to 4000 tons pressure (its nominal capacity) to form perfectly straight side rails, without camber or "bow." This eliminates the subsequent straightening operation which has been the accepted customary practice in chassis frame manufacture.

## Other "highlights" of this 4000 ton Hamilton Press

- The bed is equipped with six 42-inch diameter air cushions providing 415 tons pad-pressure with air at 100 psi.
- The cushions are linked together and the operating valves are controlled by one pilot valve so that the six cushions function as a unit at all times.
- Overall height 44 feet with topmost point 30 feet above floor.
- 320 inch clear space between the uprights and gibs; shut height on bed 40 inches.
- Stroke of slide 22 inches; adjustment 12 inches.
- Drive motor 150 hp; slide adjusting motor 25 hp.



**NEW HAMILTON PRESS**, the largest of its type ever built—4000 tons pressure capacity—is pictured here forming truck chassis side rails 22 ft. long from  $\frac{1}{4}$  in. steel at Midland Steel Products Company, Cleveland, Ohio.

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Baldwin-Lima-Hamilton Corporation

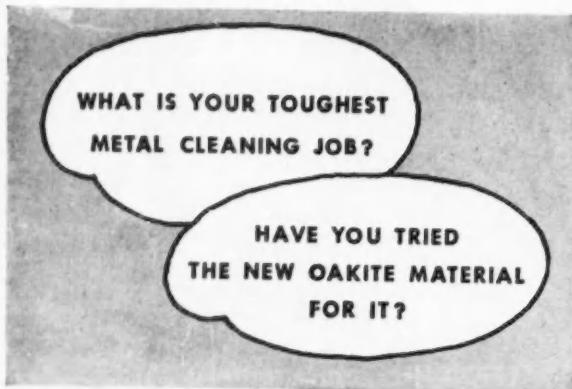
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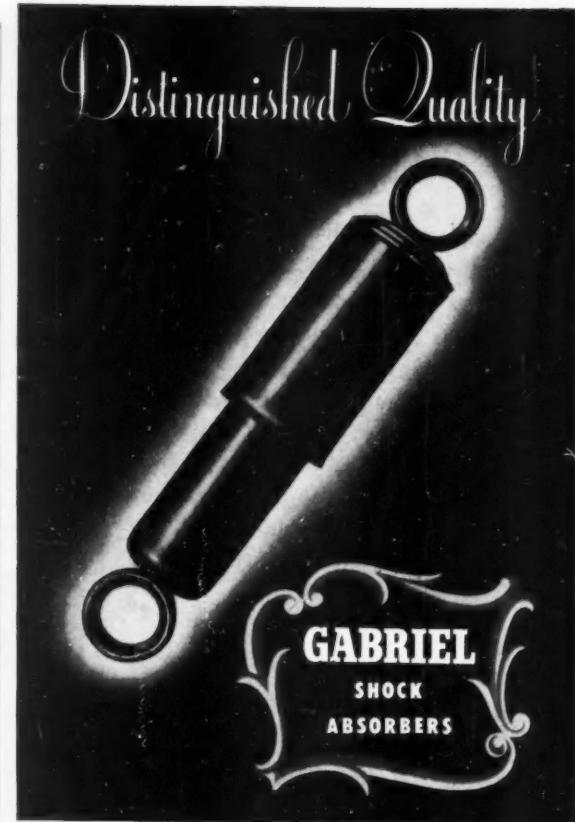
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6	7	8	9	

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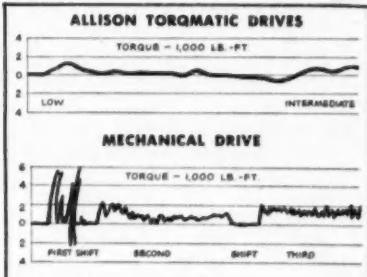
To demonstrate this, Allison engineers measured power-train shock loads in a large number of earth-moving, coal and ore-hauling trucks under both normal and extreme operating conditions. These charts show the results.

Trucks equipped with Allison TORQOMATIC DRIVES showed starting shock loads four times less severe than trucks using mechanical drives. Furthermore, trucks equipped with Allison TORQOMATIC DRIVES were quick-shifted at full throttle.

If you're operating off-highway trucks or other heavy-duty earth-moving equipment, specify Allison TORQOMATIC DRIVES, the matched team of torque converter and hydraulic transmission. Ask your dealer, equipment or engine manufacturer for further information or write to:

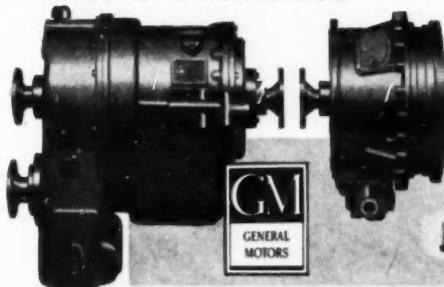
ALLISON Division of GENERAL MOTORS  
Box 894AA, Indianapolis 6, Indiana

POWER-TRAIN SHOCK LOADS



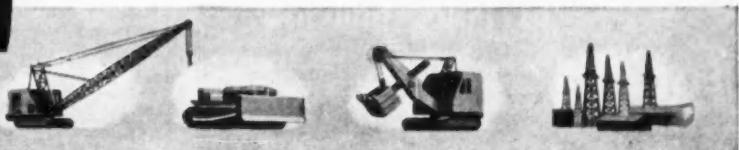
Note the jagged line — shock loads — as the mechanical drive truck pulls away from the shovel and shifts from first to second gear. Compare the smooth line — no harmful shock loads — for the truck equipped with Allison TORQOMATIC DRIVES.

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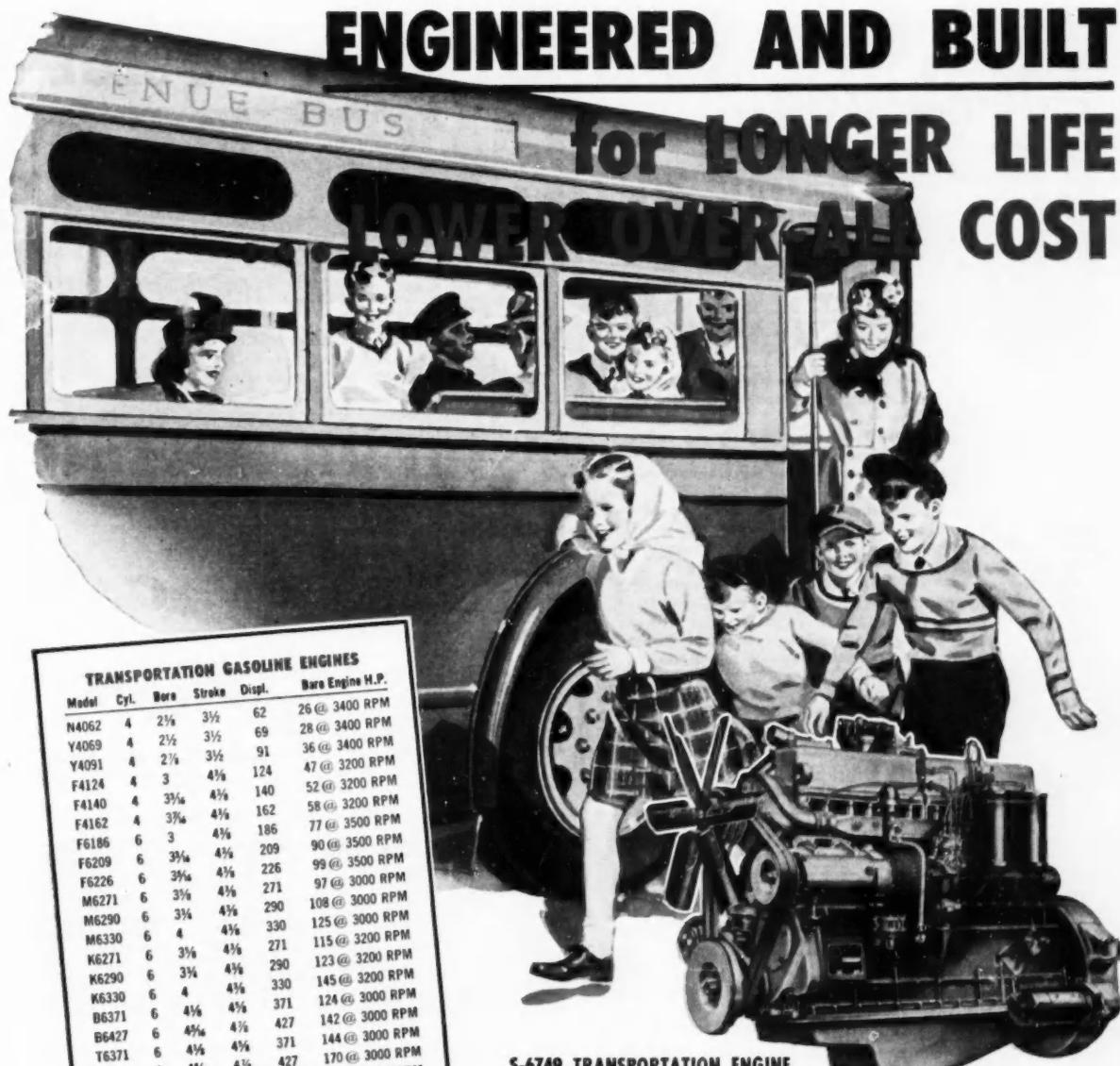


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Model	Cyl.	Bore	Stroke	Disp.	Bore Engine H.P.
N4062	4	2 1/2	3 1/2	62	26 @ 3400 RPM
Y4069	4	2 1/2	3 1/2	69	28 @ 3400 RPM
Y4091	4	2 1/2	3 1/2	91	36 @ 3400 RPM
F4124	4	3	4 1/2	124	47 @ 3200 RPM
F4140	4	3 3/4	4 1/2	140	52 @ 3200 RPM
F4162	4	3 3/4	4 1/2	162	58 @ 3200 RPM
F6186	6	3	4 1/2	186	77 @ 3500 RPM
F6209	6	3 3/4	4 1/2	209	90 @ 3500 RPM
F6226	6	3 3/4	4 1/2	226	99 @ 3500 RPM
M6271	6	3 1/2	4 1/2	271	97 @ 3000 RPM
M6290	6	3 1/2	4 1/2	290	108 @ 3000 RPM
M6330	6	4	4 1/2	330	125 @ 3000 RPM
K6271	6	3 1/2	4 1/2	271	115 @ 3200 RPM
K6290	6	3 1/2	4 1/2	290	123 @ 3200 RPM
K6330	6	4	4 1/2	330	145 @ 3200 RPM
B6371	6	4 1/2	4 1/2	371	124 @ 3000 RPM
B6427	6	4 1/2	4 1/2	427	142 @ 3000 RPM
T6371	6	4 1/2	4 1/2	371	144 @ 3000 RPM
T6427	6	4 1/2	4 1/2	427	170 @ 3000 RPM
U6501	6	4 1/2	5 1/2	501	178 @ 2600 RPM
R6513	6	4 1/2	5 1/2	513	180 @ 2800 RPM
R6572	6	4 1/2	5 1/2	572	200 @ 2800 RPM
R6602	6	4 1/2	5 1/2	602	212 @ 2800 RPM
S6749	6	5 1/2	5 1/2	749	250 @ 2800 RPM
S6820	6	5 1/2	5 1/2	820	275 @ 2800 RPM

#### TRANSPORTATION DIESEL ENGINES

Model	Cyl.	Bore	Stroke	Disp.	Bore Engine H.P.
TD6427	6	4 5/8	4 1/2	427	116 @ 2400 RPM
RD6572	6	4 1/2	5 1/2	572	162 @ 2400 RPM
SD6802	6	5 1/4	5 1/2	802	217 @ 2200 RPM

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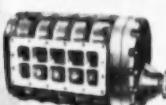
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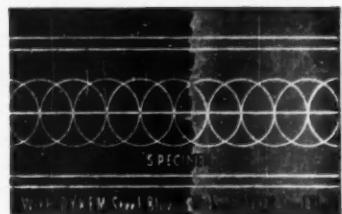
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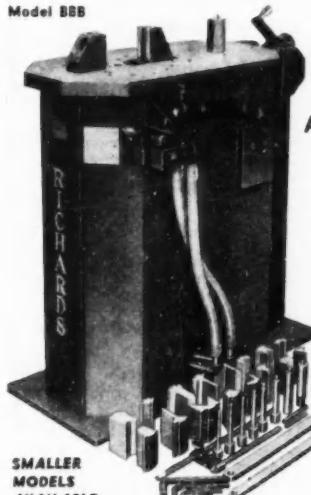
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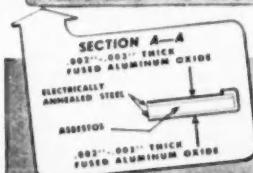
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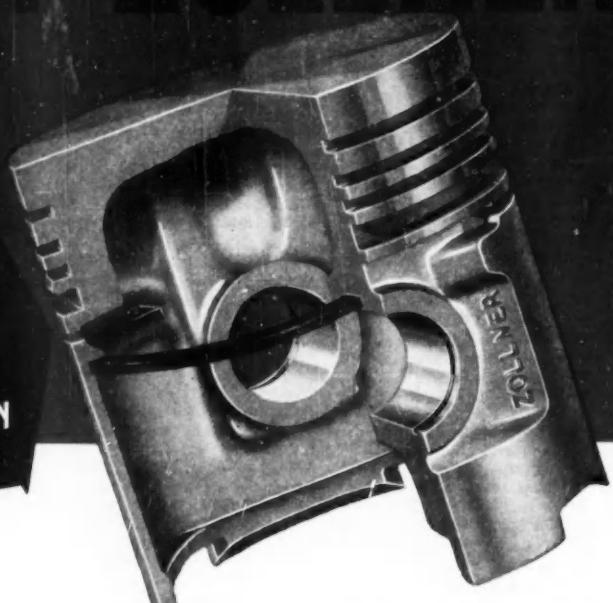
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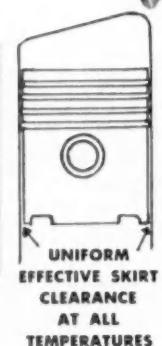
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**STEEL TENSION MEMBER**  
anchored only at pin bosses  
and cast in positive contact  
with I. D. of piston skirt  
Controls Clearance Automatically



Engine Builders, everywhere are heralding the newest accomplishment of Zollner engineers. Now pistons can be fitted to less than .001 clearance with positive uniformity of skirt bearing under all temperatures. The steel tension member incorporates in the aluminum piston the same effective expansion as the ferrous cylinder itself. The amazing new CLEAROMATIC Piston results in a quiet engine, with no cold slap, reduced friction, without any sacrifice of durability or heat conductivity. We suggest an immediate test of these advantages for your engine, now. CLEAROMATIC Pistons bring the advanced engine performance of tomorrow here today!



Design adaptable to full skirted or slipper type pistons for gasoline engines for every purpose.

- 1 Clearance maintained uniformly at all coolant temperatures from 20° below zero to 200° F.
- 2 Effective expansion identical with ferrous cylinder.
- 3 Steel tension member, with same effective expansion as cylinder, maintains uniform skirt clearance through entire temperature range.
- 4 Normal diametral clearance usually less than .001 with uniform skirt bearing.
- 5 Durability and conductivity comparable to heavy duty design.

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- PRECISION PRODUCTION in Cooperation with Engine Builders

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to speed your production

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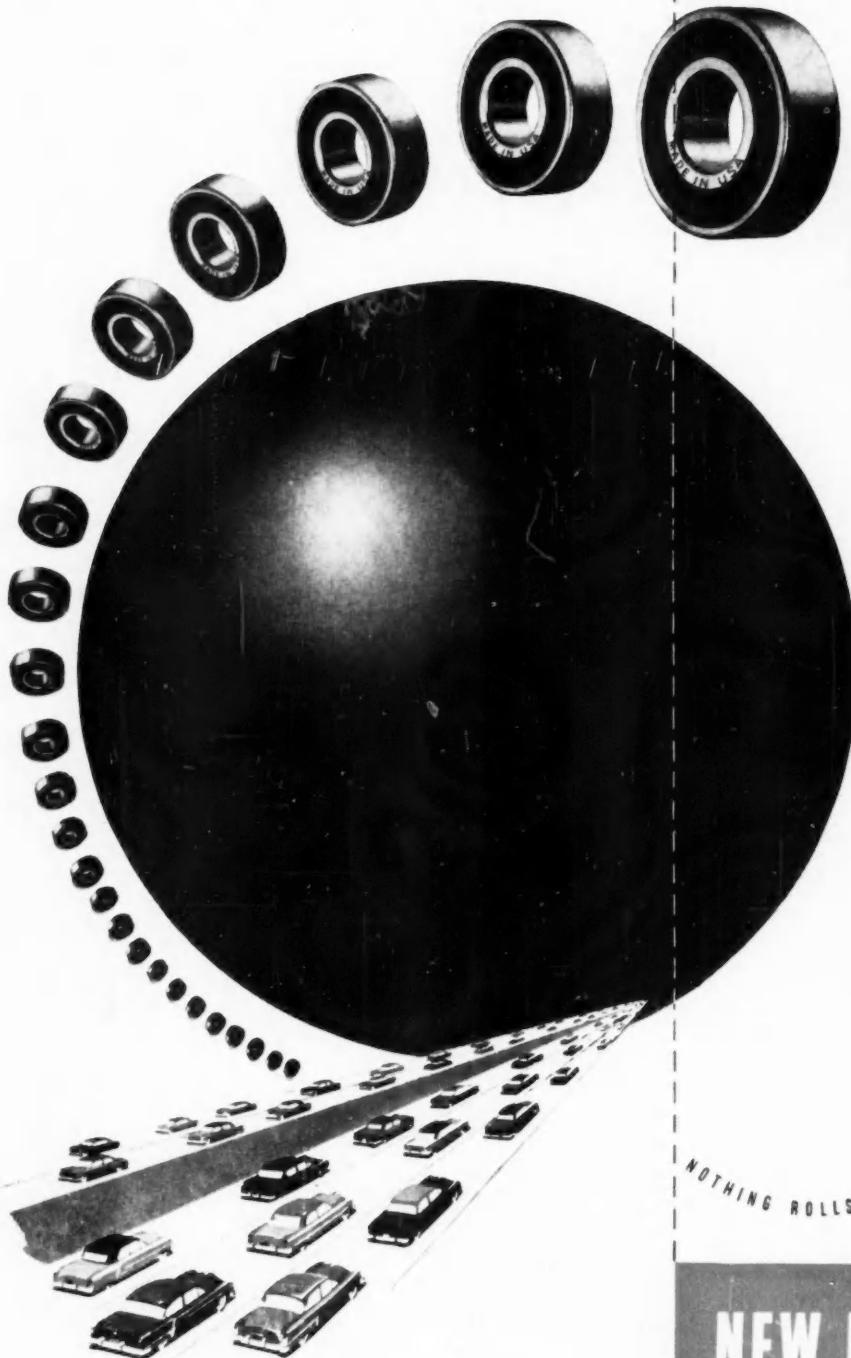
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